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COMPARING THE EFFICACY OF TWO COGNITIVE DISSONANCE  
INTERVENTIONS FOR EATING PATHOLOGY: ARE ONLINE AND FACE-TO-FACE  
INTERVENTIONS EQUALLY EFFECTIVE?

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of  
Philosophy at Virginia Commonwealth University

KASEY LYN SERDAR  
Bachelor of Science, Westminster College, 2006  
Master of Science, Virginia Commonwealth University, 2008

Major Director: Suzanne E. Mazzeo, Ph.D.,  
Associate Professor  
Department of Counseling Psychology

Virginia Commonwealth University  
Richmond, Virginia  
November 2011

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## **Abstract**

### **COMPARING THE EFFICACY OF TWO COGNITIVE DISSONANCE INTERVENTIONS FOR EATING PATHOLOGY: ARE ONLINE AND FACE-TO-FACE INTERVENTIONS EQUALLY EFFECTIVE?**

By Kasey Lyn Serdar, M.S.

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at Virginia Commonwealth University.

Virginia Commonwealth University, 2011

Major Director: Suzanne E. Mazzeo, Ph.D.

Associate Professor

Counseling Psychology Department

Clinical and subclinical eating pathology are common, especially among female undergraduates. Such problems are often chronic and associated with a range of negative medical and psychological outcomes. Thus, it is important to develop effective prevention programs to reduce eating disorder risk. Numerous studies suggest that dissonance-based prevention programs are the most successful in reducing eating disorder risk factors, however, such programs might not be convenient for students limited by scheduling restraints or geographic proximity. Further, some students may be reluctant to attend such

groups due to lack of anonymity. One way to address these potential barriers is to adapt dissonance-based programs for online use. However, no extant studies have examined the feasibility of this mode of delivery for dissonance-based programs. The current study examined the effectiveness of an online dissonance-based program, and compared it with traditional face-to-face delivery and assessment-only control conditions. It was hypothesized that: 1) online and face-to-face dissonance programs would produce comparable results; and 2) both of these active treatments would yield improvements in eating disorder outcomes (e.g. reduced thin ideal internalization, body dissatisfaction, dieting, negative affect, and eating disorder symptoms) compared with an assessment-only control condition. Results partially supported the original hypotheses. Modified intent-to-treat analyses (MITT) indicated that participants in both the face-to-face and online intervention groups showed less body dissatisfaction at post-intervention assessment compared to assessment only participants. Further, when analyses were conducted using a non-intent-to-treat (non-ITT) approach (examining only the outcomes of participants who completed the intervention), significant post-intervention differences were observed for all outcome variables. Specifically, individuals in both intervention groups showed lower thin-ideal internalization, body dissatisfaction, restraint, negative affect, and fewer eating disorder symptoms compared to assessment only participants. This study indicates that there may be some promise in adapting dissonance-based eating disorder prevention programs for online use. Future studies should continue to refine online adaptations of such programs and examine the effects of such programs with different populations.

Comparing the Efficacy of Two Cognitive Dissonance Interventions for Eating Pathology:  
Are Online and Face-to-Face Interventions Equally Effective?

Eating pathology is common, especially among college-aged women (Kirk, Singh, & Getz, 2001; Malinauskas, Raedeke, Aeby, Smith, & Dallas, 2006; Mintz & Betz., 1988; Saules et al., 2009). For instance, Kirk, Singh, and Getz (2001) found that 25.9% of a sample of college females ( $N = 403$ ) reported unhealthy eating attitudes and behaviors as assessed by the Eating Attitudes Test (EAT). Further, Mintz and Betz (1988) found that 61% of college women manifested various forms of eating pathology. Eating disorder symptoms typically fall on a continuum, ranging from extreme dieting to syndromes meeting or exceeding the clinical threshold in the *Diagnostic and Statistical Manual of Mental Disorders- Fourth Edition-Text Revision* (DSM-IV-TR; American Dietetic Association, 2006; American Psychiatric Association, 2000a; Fitzgibbon, Sánchez-Johnsen, & Martinovich, 2003; Franko & Omori, 1999; Gleaves, Brown, & Warren, 2004; Mintz & Betz., 1988; Stice, Ziemba, Margolis, & Flick, 1996; Tylka & Subich, 1999). Eating disorders are typically chronic and are associated with a variety of problems including medical complications, depression, anxiety disorders, personality disorders, and substance abuse (American Dietetic Association, 2006; Baker, Mitchell, Neale, & Kendler, 2010; Bulik, Sullivan, Fear, & Joyce, 1997; de Zwaan & Mitchell, 1993; Herpertz-Dahlmann et al., 2008; Johnson, Cohen, Kasen, & Brook, 2002; Kaye et al., 2008; Mischoulon et al., 2010; Sharp & Freeman, 1993). Further, eating disorder symptomatology is associated with lower mental health related quality of life (Hay et al., 2010). There are few empirically-based treatments for eating disorders (Berkman et al., 2006; Bhadoria, Webb, & Morgan, 2010). Further, treatment is often expensive, lengthy, and not fully covered by insurance benefits (Kalisvaart & Hergenroeder, 2007; Silber & Robb,

2002). Thus, individuals with various degrees of eating pathology typically do not receive adequate treatment. Further, those who do receive treatment often experience high rates of relapse (Bohon, Stice, & Burton, 2009; Fairburn, Cooper, Doll, Norman, & O'Connor, 2000; Keel, Dorer, Franko, Jackson, & Herzog, 2005).

Because of the range of negative outcomes associated with full syndrome eating disorders, researchers have focused on the development of programs designed to prevent these conditions (Stice & Shaw, 2004). Although several initial eating disorder prevention efforts yielded disappointing results (Carter, Stewart, Dunn, & Fairburn, 1997; Killen et al., 1993; Mann et al., 1997; O'Dea & Abraham, 2000), results from some more recent programs have been more promising (Becker, Bull, Schaumberg, Cauble, & Franco, 2008; Becker, Smith, & Ciao, 2005; Becker, Smith, & Ciao, 2006; Green, Scott, Diyankova, Gasser, & Pederson, 2005; Mitchell, Mazzeo, Rausch, & Cooke, 2007; Stice, Shaw, Becker, & Rohde, 2008; Stice, Shaw, Burton, & Wade, 2006). Specifically, dissonance-based interventions have gained the most empirical support for reducing eating disorder risk factors and eating pathology (see Stice, Shaw, Becker, & Rohde, 2008, for a review). Such programs are based on cognitive dissonance theory (Festinger, 1957) and ask participants to take an active stance against the thin-ideal of feminine beauty (Stice, Shaw, et al., 2008), thereby decreasing their internalization of these unrealistic weight/shape standards. Research has shown that dissonance-based programs are effective in decreasing known eating disorder risk factors (e.g. thin ideal internalization, body dissatisfaction, dieting, negative affect) and eating pathology (Shaw, Stice, & Becker, 2008). However, such programs can be difficult to implement in that they place a high demand on university resources and are also subject to scheduling constraints of students and administrators. Most dissonance interventions involve

four to eight sessions, which are conducted in person by trained facilitators (Stice, Shaw, et al., 2008). Further, some students may not attend such programs because of the lack of anonymity of in-person groups.

Given the logistical demands and the lack of anonymity of face-to-face dissonance-based interventions, the internet is a viable option for intervention delivery, especially for the college population. The current generation of college students is exceptionally technology-savvy, uses the internet multiple times per day, and a majority (85%) own a computer (Jones, 2002). In addition, internet interventions offer several potential advantages over face-to-face programs, including convenience, a greater sense of anonymity, and cost-effectiveness (Zabinski, Celio, Jacobs, Manwaring, & Wilfley, 2003). Thus, many psychoeducational and public health interventions are currently being adapted for online delivery (Kenardy, McCafferty, & Rosa, 2006; Sampson, Kolodinsky, & Greeno, 1997; Warmerdam, van Straten, & Cuijpers, 2007; Zetterqvist, Maanmies, Lars, & Anderson, 2003). The current study compared outcomes of an online dissonance-based intervention to those of a face-to-face dissonance-based intervention and an assessment only control group.

## **Literature Review**

### **Overview of Eating Pathology**

**Prevalence and diagnostic features.** Eating disturbance is common, especially among women. In an early study, Mintz and Betz (1988) found that 61% of college women manifested various forms of eating pathology. Although full syndrome eating disorders (EDs) occur relatively frequently, most eating disordered behavior falls along a continuum of severity (Malinauskas et al., 2006; Mintz & Betz., 1988; Saules et al., 2009). On one end of the spectrum are full threshold EDs, including anorexia nervosa (AN) and bulimia nervosa

(BN). Approximately 3% of young women between the ages of 18 and 30 struggle with a threshold ED (Ghaderi & Scott, 2001). Lifetime prevalence estimates indicate that roughly 0.3-0.6% of women in the United States have suffered from AN (Swanson, Crow, Legrance, Swendensen, and Merikangas, 2011; Garfinkel et al., 1996; Hudson, Hiripi, Pope, & Kessler, 2007; Walters & Kendler, 1995).

The DSM-IV-TR (American Psychiatric Association, 2000a) delineates the following criteria for AN: (1) refusal to maintain a normal body weight (weight is at least 15% below what would be expected for age and height), (2) fear of gaining weight, (3) body image disturbance and lack of distress over low body weight, and (4) amenorrhea (absence of at least 3 consecutive menstrual cycles in postmenarcheal females). There are two different subtypes of AN: restricting and binge-eating/purging. A *binge* refers to the consumption of an abnormally large amount of food during “a discrete period of time,” typically less than two hours, during which a person feels a loss of control regarding eating. Those with restricting AN do not engage in bingeing or purging behaviors, but accomplish weight loss by restricting food intake or participating in increased or excessive physical activity. Persons who regularly engage in bingeing and or purging behaviors are given the binge-eating/purging subtype diagnosis. However, it is important to note that this subtype of AN can be assigned to persons engaging in purging behaviors even after consuming small amounts of food. AN is one of the most life-threatening psychiatric disorders (Agras, 2001; Mitchell & Crow, 2006), with mortality rates of 5.6% per decade (Sullivan, 1995). The typical age of onset is between 13 and 18 years (American Psychiatric Association, 2000a; Hudson et al., 2007). Although the course of AN can be quite variable (American Psychiatric Association, 2000a; Hudson et al., 2007), for many individuals this disorder has a chronic course (Steinhausen, 2002).

BN is more common than AN, with lifetime prevalence estimates ranging from 0.9-3% across studies (BN; Swanson et al., 2011; Bushnell, Wells, Hornblow, Oakley-Browne, & Joyce, 1990; Favaro, Ferrara, & Santonastaso, 2004; Garfinkel et al., 1995; Garfinkel et al., 1996; Hoek & van Hoeken, 2003; Hudson et al., 2007; Kendler et al., 1991; Walters & Kendler, 1995). Core DSM-IV-TR diagnostic criteria for BN are as follows: (1) recurrent episodes of binge eating, (2) use of compensatory behaviors (e.g. self-induced vomiting, excessive exercise, use of laxatives, enemas, or diuretics) to prevent weight gain, (3) both bingeing and compensatory behavior must occur at least twice a week for three months, and (4) self-evaluation is highly dependent upon shape and weight. There are two different subtypes of BN, purging or nonpurging. Each subtype is differentiated by the types of compensatory behaviors used. Individuals with the purging subtype regularly engage in self-induced vomiting, use of laxatives, enemas, or diuretics. In contrast, those with the nonpurging subtype use behaviors such as fasting and excessive exercise to compensate for their binge episodes. A typical binge eating episode involves the rapid consumption of calorie dense foods. Usually, these episodes occur in secret, involve eating far past the point of satiety, and may be followed by intense negative affect. The most commonly employed compensatory behavior is self-induced vomiting. Often, compensatory behaviors are followed by feelings of physical and mental relief. Unlike AN, individuals with BN are typically normal weight or overweight (American Psychiatric Association, 2000a). BN typically has a later age of onset than AN (from late adolescence to early adulthood) and a broader period of onset risk according to recent research (Hudson et al., 2007).

In addition to full syndrome EDs (AN and BN), many individuals display clinically significant eating disorder symptoms (e.g. strict dieting, occasional bingeing, etc.). Such

symptoms are significant enough to affect a person's functioning, but not all criteria are met for either AN or BN (Franko, Wonderlich, Little, & Herzog, 2004). Most of these behaviors would merit a diagnosis of Eating Disorder Not Otherwise Specified (EDNOS), as defined in the DSM-IV-TR (American Psychiatric Association, 2000a). Research indicates that there are more individuals who show subthreshold eating pathology than are diagnosed with AN or BN (Chamay-Weber, Narring, & Michaud, 2005). This is important to note, as interventions for eating pathology typically yield more positive results for individuals with less severe eating disordered behavior (American Psychiatric Association, 2000b; Johnson, 2003; Pritts & Susman, 2003).

Also included within the EDNOS category is binge-eating disorder (BED), which is designated by the *DSM-IV-TR* as a diagnosis requiring further study. In essence, the BED diagnosis encompasses individuals who engage in binge eating episodes, but do not engage in any compensatory behaviors. These binge eating episodes must also be characterized by significant distress and must occur at least twice weekly for a minimum of six months. Although BED is not currently considered an official DSM-IV-TR diagnosis, it is estimated that 0.7% to 4% of non-treatment seeking persons may meet the required diagnostic criteria for BED (American Psychiatric Association, 2000a). Proposed revisions in the DSM-V include formalizing BED as an official diagnosis (American Psychiatric Association, 2010). These proposed revisions are based in part on a review conducted by Wonderlich, Gordon, Mitchell, Crosby, and Engel (2009), which highlights research supporting that BED is a valid diagnosis that is distinguishable from other eating disorders (AN and BN), with limited diagnostic cross over. Findings from the review also highlight that individuals with BED show levels of eating disordered behavior, subjective distress, impairments in quality of life,



and psychiatric comorbidity that are comparable to individual with AN and BN, thus indicating that individuals with BED show clinically significant levels of psychopathology. This study purports that there is clinical utility in establishing a formal BED diagnosis because of research indicating that BED differs from other eating disorders on factors relevant to treatment (e.g. recovery rates, age of onset, gender distribution, diagnostic stability). Taken together, findings indicate that BED is diagnostically distinct from other eating disorders, and research supports the clinical utility of such a diagnosis.

**Psychiatric and physical comorbidities.** It is common for individuals suffering from threshold and subthreshold eating disordered symptoms to experience significant distress due to comorbid psychological conditions (Gleaves, Eberenz, & May, 1998; Godart, Flament, Lecrubier, & Jeammet, 2000; Godart, Flament, Perdereau, & Jeammet, 2002; Godarta et al., 2007; Godt, 2002; Klump, Bulik, Kaye, Treasure, & Tyson, 2009). Mood disorders are commonly comorbid with both AN and BN (Herzog, Keller, Sacks, Yeh, & Lavori, 1992; Herzog, Nussbaum, & Marmor, 1996; Kaye et al., 2008; Mischoulon et al., 2010). For instance, Mischoulon et al. (2010) conducted a longitudinal study of 246 women with AN or BN; 63% of participants had been diagnosed with MDD during their lifetime. A minority of this group ( $n = 11$ ) had a history of MDD prior to study intake. A large percentage (59% of the total study sample) either had MDD at study intake ( $n = 100$ ) or developed MDD during the course of the study ( $n = 45$ ).

Studies have also found that anxiety disorders frequently co-occur with both AN and BN (Brewerton et al., 1995; Bulik et al., 1997; Halmi et al., 2003; Herzog et al., 1992; Kaye et al., 2004; Lilenfeld et al., 1998). For instance, in a large sample ( $N = 672$ ) of individuals with AN ( $n = 97$ ), BN ( $n = 282$ ), and AN and BN ( $n = 293$ ), Kaye et al. (2004) found that

approximately two-thirds reported a lifetime history of an anxiety disorder. The anxiety disorders most frequently seen among eating disordered participants were obsessive compulsive disorder (OCD; 41%) and social phobia (20%). Their research also indicated that the onset of the anxiety disorders typically predated the onset of the ED. Prevalence of different anxiety diagnoses were similar across ED subtypes, with the exception of post-traumatic stress disorder (PTSD), which was three times more likely among individuals with BN or combined AN and BN than among AN participants. Research indicates that substance abuse is also commonly comorbid with EDs. For instance, in a population-based sample of monozygotic ( $n = 1206$ ) and dizygotic ( $n = 877$ ) female twins, Baker, Mitchell, Neale, and Kendler (2010) found 22% of participants with AN and 24% of participants with BN reported a lifetime history of alcohol abuse. Further, 17% of participants with AN and 19% of participants with BN reported a history of illicit drug abuse.

In patients with chronic eating disordered behaviors, physical symptoms are also common and can be extremely dangerous (de Zwaan & Mitchell, 1993; Mitchell & Crow, 2006; Rosen & American Academy of Pediatrics Committee on Adolescence, 2010; Sharp & Freeman, 1993). Such symptoms include anemia, dehydration, amenorrhea, osteoporosis, constipation, skin dryness, hypothermia, dental erosion, liver function abnormalities, metabolic acidosis, permanent dental damage, and cardiovascular problems (Rosen & American Academy of Pediatrics Committee on Adolescence, 2010). Physical complications can occur as the result of malnutrition and/or purging activities. Although research indicates that many of the medical complications associated with EDs resolve themselves with refeeding and/or resolution of purging behaviors (Brambilla & Monteleone, 2003), some complications (e.g. growth retardation, structural brain changes, low bone mineral density)

may not be reversed with resolution of symptoms (Mitchell & Crow, 2006). When severe, symptoms associated with dehydration, such as electrolyte imbalances, require immediate medical attention due to their potential to cause significant cardiovascular problems (American Psychiatric Association, 2000a). Further, eating disordered behavior has also been linked to significant cognitive deficits (due to nutritional deprivation), mood symptoms, and suicide (Rosen & American Academy of Pediatrics Committee on Adolescence, 2010).

In sum, eating disordered behavior is common, especially among women. Individuals' symptoms can range from subthreshold eating pathology (including BED) to full syndrome EDs (AN and BN). Further, EDs are associated with other physical and psychological problems that can impair well-being. Because EDs are associated with such negative outcomes and are difficult to treat, researchers have focused on understanding risk factors that may promote the development of disordered eating behavior.

### **Factors Promoting Eating Pathology Development**

**Genetics and temperament.** It is generally agreed that the etiology of EDs is multifaceted and a number of biological, psychological, and sociocultural factors contribute to susceptibility to unhealthy eating patterns and body dissatisfaction (Jacobi, Hayward, de Zwaan, Kraemer, & Agras, 2004; R. H. Striegel-Moore & Bulik, 2007). There are a number of genetic and temperamental factors that may interact to promote ED development. For instance, results of twin studies show that between 50 and 83% of the variance for threshold and subthreshold EDs (including AN, BN, BED, and subthreshold AN and BN) can be explained by genetic factors (Root et al., 2011; Bulik, Sullivan, & Kendler, 1998; Bulik et al., 2006; Kendler et al., 1991; Klump, Miller, Keel, McGue, & Iacono, 2001; Reichborn-Kjennerud, Bulik, Tambs, & Harris, 2004; Wade, Bulik, Neale, & Kendler, 2000).

Other research indicates that certain temperamental qualities, such as perfectionism or impulsivity may put individuals at risk for eating disturbance (Cassin & von Ranson, 2005). Specifically, individuals with clinical EDs (AN and BN) tend to show higher overall levels of perfectionism, obsessive compulsiveness, negative emotionality, neuroticism, and harm avoidance (Cassin & von Ranson, 2005; Fassino, Amianto, Gramaglia, Facchini, & Abbate Daga, 2004). Research has suggested that personality characteristics might be related to ED subtype. Individuals with AN tend to show higher levels of constraint and persistence and lower novelty seeking, whereas individuals with BN generally show higher levels of impulsivity, sensation seeking, and novelty seeking (Cassin & von Ranson, 2005). Both genetic and temperamental factors are important to consider in determining the etiology of eating disturbance. This is because genetic factors can influence temperament, which may interact with environmental factors that promote ED development. For example, individuals may have a temperament that leads them to select themselves into environments in which appearance and image are of critical importance (e.g. dance, gymnastic, modeling, etc). The interplay of genetic risk due to temperament and environmental factors can promote the development of ED symptoms (Mazzeo & Bulik, 2009).

Although genetic and temperamental influences are critical factors that may influence individuals' choice of environment, such factors are currently difficult to target in prevention. ED prevention efforts tend to focus upon known risk factors for eating pathology that are amenable to change through intervention. Thus, the current review will focus mainly on the factors that have been targeted in extant research on ED prevention.

**Dual-pathway model.** Prospective research (Stice, 2001; Stice & Agras, 1998) has attempted to identify how a number of important risk factors might promote the development

of eating pathology. For instance, Stice (2001) proposed a dual-pathway model of bulimic pathology (see Stice, 2001, Figure 1, p. 125), which posits that BN symptom development can be explained by integrating sociocultural (Striegel-Moore, Silberstein, & Rodin, 1986), dietary (Polivy & Herman, 1985), and affect regulation (McCarthy, 1990) perspectives. Specifically, this model posits that thin-ideal internalization promotes body dissatisfaction among women, as most women are unlikely to attain these unrealistic body size ideals. Stice's model also proposes that women who receive pressure to be thin from family and peers are more likely to show body dissatisfaction because they have received repeated messages that their weight/shape is not acceptable. Increased body dissatisfaction is thought to lead to dietary restriction, because women often view dieting as an effective method for weight control. In turn, women with body dissatisfaction show increased negative affect because their self-evaluation is central to their overall well-being (Joiner, Wonderlich, Metalsky, & Schmidt, 1995). Dieting is likely to lead to negative affect as individuals who restrict their food intake to lose weight often fail repeatedly at weight loss, which may foster feelings of frustration and helplessness. Dieting is also thought to have the potential to promote bulimic symptomatology. Specifically, intense caloric restriction often promotes periods of disinhibited (binge) eating (Polivy & Herman, 1985). Further, negative affect might also lead to bulimic symptomatology because individuals could turn to food for comfort when they are experiencing negative emotions (Stice, 2001).

Extant research supports Stice's (2001) dual pathway model. For instance, Stice (2001) evaluated the model in a longitudinal investigation of 231 female adolescents (*M age* = 14.9 years). Results supported all mediational effects of the model, with pressure to be thin, thin-ideal internalization, body dissatisfaction, dieting, and negative affect all predicting

development of bulimic symptoms over a 20-month period. Similarly, in a cross-sectional study, Shephard and Ricciardelli (1998) examined Stice's model in a sample of 412 female high school ( $n = 166$ ,  $M age = 15.5$ ,  $SD = 0.7$ ) and university students ( $n = 246$ ,  $M age = 20.2$ ,  $SD = 4.9$ ). Results supported Stice's model by indicating that dietary restraint and negative affect partially mediated the relationship between body dissatisfaction and symptoms of BN. Similarly, Stice and Agras (1998) conducted a study in which they examined the factors contributing to the development of bulimic behaviors in a sample of adolescent girls ( $N = 218$ , age range = 16-18) over a nine month period. Results showed that internalization of the thin ideal, perceived pressure to be thin, body dissatisfaction, and dieting were all associated with subsequent bulimic symptomatology.

Other investigations support some of the specific risk factors outlined in Stice's dual pathway model. For instance, research supports the association between thin-ideal internalization and eating pathology (Stice & Agras, 1998; The McKnight Investigators, 2003; Wichstrom, 2000). Further, various studies have shown specific associations between eating pathology and body dissatisfaction (Cooley & Toray, 2001; Field, Camargo, Taylor, Berkey, & Colditz, 1999; Killen et al., 1994; Killen et al., 1996; Wichstrom, 2000), dieting (Patton, Johnson-Sabine, Wood, Mann, & Wakeling, 1990), pressure to be thin (Field et al., 1999; Stice & Agras, 1998), and negative affect (Field et al., 1999; Killen et al., 1996; Stice & Agras, 1998; Wichstrom, 2000).

Stice's dual pathway model was developed with a focus on preventing bulimic symptomatology. BN (threshold and subthreshold) is the most common form of eating pathology seen among young women (American Psychiatric Association, 2000a). However, many of the risk factors which are the focus of Stice's dual pathway model (thin-ideal

internalization, dieting, pressure to be thin, negative affect) have been identified as risk factors for a range of disordered eating behaviors (Jacobi et al., 2004).

### **Eating Pathology in College-Aged Women**

Women of traditional college-age tend to have high prevalence of EDs and subthreshold or partial-syndrome EDs compared with women in other age groups (Kirk et al., 2001; Malinauskas et al., 2006; Mintz & Betz., 1988; Saules et al., 2009). Indeed, the peak age of onset for BN parallels the approximate age of young women entering undergraduate studies in the United States (i.e. 16 to 20 years old; American Psychiatric Association, 2000a). In one study of 185 college women, 83% reported dieting to control their weight (Malinauskas et al., 2006). Moreover, women reported skipping breakfast (32%), smoking (9%), vomiting (5%), and using laxatives (3%) for weight control; 58% also reported experiencing social pressure to lose weight. Women classified as underweight (i.e. those with a body mass index, BMI, lower than 18.5) were excluded from these analyses. It is possible that by excluding such participants, reported ED behaviors were actually underestimated.

Other studies have also found high prevalence of eating disordered behavior in college women. In one study, 37.2% of college students ( $N = 395$ ) reported binge-eating behaviors (Saules et al., 2009). Participants who viewed themselves as overweight were significantly more likely to binge eat (42.6%) than their non-overweight classmates (30.1%). Hoerr, Bokram, Lugo, Bivins, & Keast (2002) assessed the frequency of disordered eating behaviors in 1,620 college students (81% White). In this sample, 4.5% of women reported undergoing previous treatment for EDs, a percentage slightly higher than reported in the general population (American Psychiatric Association, 2000a). Moreover, based on their scores on the EAT-26 (Eating Attitudes Test), 10.9% of women demonstrated definite “risk

for eating disorder” (Hoerr et al., 2002). These findings were replicated by Thome and Espelage, (2004). Vohs, Heatherton, and Herrin (2001) found that body dissatisfaction, a symptom implicated in the onset of ED symptoms (Stice & Shaw, 2002), increased during the transition from high school to college. Finally, another study found that shape concern and dietary restraint significantly increased in first year college students from the fall to the spring semester (Delinsky & Wilson, 2008).

There are a number of hypotheses regarding the process through which the college environment might promote eating disordered pathology. College-aged women, for example, might be susceptible to (or even fearful of) what has been coined the “Freshman 15.” This term refers to the notion that college students often gain 15 pounds during their first year of school (Delinsky & Wilson, 2008). Concern about the “Freshman 15” has been linked to weight and shape concern, as well as dietary restraint. For instance, Delinsky and Wilson (2008) found that dietary restraint and concern about the “Freshman 15” were related to eating disorder symptoms in a sample ( $N = 366$ ) of women assessed at the beginning and end of their freshman year (September and April). Moreover, 37% of the participants in this sample described themselves as overweight at the end of the school year. However, only 18% were actually “overweight.” This discrepancy highlights the elevated (and apparently irrational) fear of weight gain many college students experience. These findings are consistent with those of Vohs et al. (2001). Weight gain during college is problematic, as elevated adiposity has been identified as a precursor to increased risk for eating pathology (Striegel-Moore et al., 2000). This elevated risk for disordered eating is thought to result from increased body dissatisfaction and dieting, as well as familial and societal pressures to lose weight (see Stice & Shaw, 2002, for a review).



Researchers have also identified a significant association between stress and disordered eating (Freeman & Gil, 2004). Stress (good and bad) is a major part of the transition to college (e.g. increased academic pressure, loss of immediate social support networks, identity confusion). In one study, college women who reported engaging in binge eating were more likely to binge on days in which they experienced higher stress (Freeman & Gil, 2004). In sum, there are a number of factors that have been identified as risk factors or precursors to EDs and disordered eating behaviors. The influence of many of these factors appears to increase in the college environment. Investigators have thus implemented numerous interventions for college women in an attempt to reduce body- and weight-related concerns within this vulnerable population.

### **Prevention of Eating Pathology**

Most individuals who exhibit eating pathology never seek treatment (Fairburn et al., 2000; Johnson et al., 2002) and those who do often show chronic symptoms and high relapse rates (Agras, Walsh, Fairburn, Wilson, & Kraemer, 2000; Fairburn et al., 2000; Fairburn, Jones, Peveler, Hope, & O'Connor, 1993; Telch, Agras, & Linehan, 2001; Wilfley et al., 2002). Thus, a major focus has been placed on the prevention of disordered eating (Stice & Shaw, 2004).

**History of eating disorder prevention.** Preventive efforts for eating pathology have changed over time in both their focus and method of delivery. In their meta-analysis of ED prevention programs, Stice and Shaw (2004) outlined characteristics of three different “waves” of ED prevention. The first wave of programs (generally conducted during the early to late 1990s) had didactic format and a focus on psychoeducational material about EDs. Such programs were considered “universal,” in that they targeted all available individuals.

The rationale behind this wave of intervention programs was the belief that providing information about the deleterious effects of EDs would deter individuals from developing such maladaptive patterns.

Second wave prevention programs (which began in the late 1990s) also had a universal focus and didactic format. However, these efforts differed from first wave programs by focusing on identifying and resisting sociocultural pressures to be thin and emphasizing use of healthy weight control behaviors. These additions reflected the added assumption that eating pathology was, at least in part, caused by individuals' attempts to achieve unrealistic sociocultural standards of thinness (Striegel-Moore et al., 1986) through engaging in unhealthy practices such as extreme dieting, purging, etc. (Stice & Shaw, 2004).

Results from research on these first two waves of ED prevention have not been encouraging (Levine & Smolak, 2001; Yager & O'dea, 2008). Overall, findings suggest that programs have been either ineffective (Killen et al., 1993; Paxton, 1993) or had iatrogenic effects (Carter et al., 1997; Mann et al., 1997). For example, Killen et al. (1993) conducted an 18-lesson psychoeducational intervention in a sample of 967 sixth and seventh grade girls ( $M\ age = 12.4, SD = .72$ ) and found that the program did not achieve the desired effects. Individuals showed a slight increase in eating disorder knowledge but did not show changes in eating attitudes and unhealthful weight regulation practices.

Even more alarming is research documenting potential iatrogenic effects of ED prevention. For instance, Carter et al. (1997) conducted a pilot study of a school-based ED prevention program that was designed to reduce dietary restraint in a sample of 46 adolescent girls ( $M\ age = 13.1, SD = 0.3$ ). The program had a universal focus (targeting all girls from two secondary school classes) and was conducted weekly over the course of eight weeks. It

consisted of psychoeducational material and cognitive and behavioral monitoring (including keeping track of their eating for two weeks). Findings showed that, although the program appeared to have positive effects after intervention delivery (knowledge about eating disorders increased and eating disordered behavior decreased), results were short-lived. At six month follow-up, participants showed increased levels of knowledge about EDs, but eating disordered features had returned to baseline levels. Alarming, participants' dietary restraint increased compared to baseline. Such results are concerning because dieting has been highlighted as a risk factor for the development of eating disordered behavior (Jacobi et al., 2004). Of note, this study did not include a control group, so it is possible that the differences observed were developmental in nature. Nonetheless, the negative results raise concern about the potential for negative effects of ED prevention programs.

Another study conducted by Mann et al. (1997) found similar unexpected results following an intervention conducted with a sample of 788 college freshman women (17-20 years of age). The intervention included discussion groups in which two women with histories of EDs discussed their experiences. Results indicated that participants in the intervention showed increased eating disordered behavior compared to control participants at one-month follow-up. Although baseline scores were not controlled, investigators noted that there were no baseline differences between the intervention and control participants. Given the surprising findings, researchers hypothesized that the program may have inadvertently reduced the stigma associated with EDs such that eating disordered behaviors were normalized.

These disappointing results from programs from the first two waves of ED prevention prompted a shift in focus and method of delivery for programs now considered to be part of

the third wave of ED prevention. This wave of preventive efforts is marked by a change from the universal focus seen in the first two waves, to a “selective” focus, which targets individuals identified as having higher than average risk for the development of eating pathology (Stice & Shaw, 2004). This change was made because it has been noted that many of the ineffective (or potentially harmful) interventions of the first two waves targeted girls and women of all risk levels simultaneously (Fingeret, Warren, & Cepeda-Benito, 2006). Thus, researchers felt it necessary to develop programs which were appropriate for each individual’s level of risk, focusing most intensely on women at greatest risk for eating pathology (e.g. individuals with self-identified weight/shape concerns). Additionally, programs from the third wave tend to move away from the psychoeducational format (which may inadvertently normalize EDs or provide individuals with too much detail about EDs) to emphasize interactive exercises that focus on established risk factors for eating pathology (Stice & Shaw, 2004). Such factors include thin-ideal internalization, body dissatisfaction, dieting, and negative affect (Stice, Shaw, & Marti, 2007). Further, programs from the third wave do not place emphasis on “recovered” individuals sharing their experience, as such preventive efforts appear to promote iatrogenic effects (Mann et al., 1997).

Results from research on the third wave of eating disorder prevention have been encouraging (Shaw et al., 2008; Stice & Shaw, 2004; Stice et al., 2007). In a meta-analysis of such programs, Stice, Shaw, and Marti (2007) found that 51% of ED prevention programs reduced ED risk factors (i.e. thin-ideal internalization, body dissatisfaction, dieting, negative affect, eating pathology). Further, 29% reduced eating pathology. Stice and Shaw (2004) identified characteristics of programs that produced larger effect sizes. Such characteristics included: (1) a selective (versus universal) focus in target populations (i.e. individuals with

identified weight/shape concerns), (2) interactive (versus didactic) format, which includes in session activities, discussion among participants, and homework, (3) a focus on individuals older than 15 years of age, (4) a focus exclusively on women versus mixed gender groups, (5) multiple sessions versus a single session, and (6) use of validated measures. Surprisingly, program content did not emerge as a major indicator of larger effect sizes, suggesting that content is less important than delivery format (interactive) and participant characteristics (high-risk). Thus, although the effectiveness of first and second wave ED prevention programs has generally been limited, recent research provides new directions for the development of interventions with greater promise for decreasing ED symptoms and risk factors.

### **Dissonance-Based Prevention for Eating Pathology**

Dissonance-based programs currently have the greatest empirical support among ED prevention efforts (Shaw et al., 2008; Stice & Shaw, 2004; Stice et al., 2007; Yager & O'dea, 2008). Dissonance theory has its roots in social psychology and posits that individuals who come to hold conflicting cognitions are likely to change an original attitude because of the psychological discomfort caused by inconsistency between old and new cognitions. Thus, if individuals are encouraged to adopt a counter-attitudinal stance in which they think or act in a way that defies their original attitude, they are likely to change their original cognitions. This occurs because there is a discrepancy or dissonance between their old attitude and the cognitions generated by acting differently (Festinger, 1957). Research indicates that individuals are most likely to have an attitudinal shift (as a result of cognitive dissonance) if they feel they adopted the new attitude voluntarily rather than at the demand of others or the situation (Killen, 1985).

Dissonance interventions have been employed to promote change in a variety of problems including smoking (Killen, 1985), substance abuse (Ulrich, 1991), obesity (Axsom & Cooper, 1981), chronic illness (Leake et al., 1999), safe sexual practices (Stone et al., 1994), and phobias (Cooper, 1980; Cooper & Axsom, 1982). Using the evidence base from these interventions, Stice and colleagues (Stice, Chase, Stormer, & Appel, 2001; Stice, Marti, Spoor, Presnell, & Shaw, 2008; Stice, Mazotti, Weibel, & Agras, 2000; Stice et al., 2006; Stice, Trost, & Chase, 2002; Stice, Trost, & Chase, 2003) have applied dissonance principles to prevention efforts for disordered eating. These interventions aim to reduce thin-ideal internalization and other ED risk factors (e.g. body dissatisfaction, dieting, and negative affect) by asking participants to take a stance against the thin-ideal through a series of interactive verbal, written, and behavioral interventions delivered across multiple sessions. By engaging in these activities, it is thought that participants' internalization of the thin-ideal will decrease (Stice, Shaw, et al., 2008).

To date, dissonance-based (DB) interventions for eating pathology have been investigated by six independent research teams (Stice, Shaw, et al., 2008). Studies include efficacy trials in which participants are actively recruited and trained research staff deliver the intervention, as well as effectiveness trials in which the interventions are delivered by endogenous providers (e.g. peer-leaders, school counselors) in less controlled settings (e.g. sororities, schools). Overall, results from both efficacy and effectiveness trials indicate that participants randomly assigned to DB interventions (of various lengths) showed significant reductions in ED risk factors (including thin-ideal internalization, body dissatisfaction, dieting, negative affect) and BN symptomatology compared to control participants. Reductions for some of these risk factors (thin-ideal internalization and body dissatisfaction)

have been maintained across various follow-up periods (ranging from one month to three years; Stice, Shaw, et al., 2008). These results are reviewed in greater detail in the following sections.

**Efficacy trials.** Results from efficacy trials support the utility of DB interventions in reducing several risk factors for eating pathology, as well as BN symptomatology. For instance, in a preliminary investigation, Stice et al. (2000) examined whether a three-session wait-list control DB intervention produced reductions in ED risk factors and BN symptomatology in 30 college women (18 to 22 years of age, *mode* = 18 years) who identified themselves as having body image concerns. Intervention participants showed decreased thin-ideal internalization, body dissatisfaction, negative affect, and BN symptomatology at post-testing compared with women in the control group. Results for all risk factors except negative affect were maintained at one-month follow-up. Further, although participants in the control group manifested increases in BN symptoms from pretest to follow-up, intervention participants did not show such increases.

Stice et al. (2001) subsequently conducted a second study in a larger sample of college women ( $N = 87$ , 17 to 29 years of age, *mode* = 19). This study involved both random assignment and an active placebo control condition (healthy weight [HW] control). As in the first trial, participants self-identified as having body image concerns. After completing baseline measures, participants were randomly assigned to either a DB intervention or a HW control intervention. The HW intervention was chosen as the placebo control group because such interventions have not previously been effective (Killen et al., 1993; Smolak, Levine, & Schermer, 1998) in reducing disordered eating pathology. Results indicated that participants in the DB group manifested decreases in thin-ideal internalization, body dissatisfaction,

dieting, negative affect, and BN symptomatology from baseline to post-testing and also at one-month follow-up. The reductions seen in thin-ideal internalization and body dissatisfaction were significantly larger than those observed in the HW control condition, suggesting that the DB interventions might have greater effect on these specific outcomes. However, unlike previous research (Killen et al., 1993; Smolak et al., 1998) in which HW interventions did not significantly reduce ED risk factors, findings from the this study indicated the participants in the HW condition did manifest reductions in body dissatisfaction, dieting, negative affect, and bulimic symptoms. Stice et al. (2001) suggested that these effects might have occurred because they had inadvertently developed an effective control intervention. These researchers further posited that this control condition may have worked because it motivated individuals to engage in healthy lifestyle changes which in turn promoted more body satisfaction and improved mood.

A third efficacy trial (Stice et al., 2002) investigated how the DB and HW interventions used in previous trials compared to a wait-list control condition. Such comparisons enabled researchers to examine differences in outcomes yielded by two potentially effective interventions (DB and HW) relative to control participants. This trial used a larger sample ( $N = 148$ ) of adolescent girls ( $Mean = 17.4$  years) who reported body image concerns. Participants were randomly assigned to one of the three conditions. This study also improved upon previous trials by collecting follow-up data at three and six months to examine long term effects. Results indicated that both active interventions produced greater decreases in thin-ideal internalization, body dissatisfaction, negative affect, and BN symptoms from baseline to post-testing compared to the control group.



In the most comprehensive randomized efficacy trial of DB interventions, Stice, Shaw, Burton, and Wade (2006) compared the effects of a DB and HW interventions to expressive writing and assessment only control conditions. Participants were 481 adolescent girls ( $M\ age = 17$ ,  $SD = 1.4$ ) recruited from high schools and a university setting. Participants had to report body image concerns to be included in the study. The study improved upon previous trials by including an active control condition (expressive writing) and an assessment only control group. Further, diagnostic interviews were used instead of self-report measures. The study also examined a longer follow-up period (six months and one year) and had a larger, more ethnically diverse sample. Results indicated that from pretest to posttest, the DB program produced significantly greater reductions in eating disorder risk factors and bulimic symptoms compared to the HW, expressive writing, and assessment only groups. HW participants showed significant reductions in eating disorder risk factors and bulimic symptoms compared to the expressive writing and the assessment only control conditions. These results diminished over the follow-up periods assessed; nonetheless, participation in DB and HW interventions was associated with decreases in binge eating, obesity onset, and reduced health service utilization (measured via visits to health and mental health practitioners) at 12 month follow-up. These findings are encouraging as they indicate that both DB and HW interventions have public health potential.

In a follow-up study outlining the long term (two and three year) outcomes of participants in the former study (Stice et al., 2006), Stice, Marti, Spoor, Presnell, and Shaw (2008) found that DB participants continued to showed greater decreases in thin-ideal internalization, body dissatisfaction, negative affect, eating disorder symptomatology, and psychosocial impairment compared to assessment only participants. Further, DB participants

manifested lower risk for eating pathology onset during this time period. DB participants also had greater decreases in thin-ideal internalization, body dissatisfaction, and psychosocial impairment compared to those in the expressive writing group. When comparing HW to assessment only participants, results indicated that HW participants showed greater decreases in thin-ideal internalization, body dissatisfaction, negative affect, eating disorder symptoms, and psychosocial impairment than assessment only participants. Further, their weight was also less likely to increase and they were less likely to show eating disorder and obesity onset through two and three-year follow-up compared to assessment only participants. HW participants also manifested greater decreases in thin-ideal internalization than expressive writing participants. Overall, this study indicated that the reduction in risk for onset of eating pathology was 60% for DB participants and 61% for HW participants, respectively. Further, HW participants showed a 55% reduction in risk for obesity onset compared to assessment only control participants at three-year follow-up. Such findings indicate that both DB and HW interventions have promise for reducing ED risk factors. Authors of this study highlight that DB and HW have different strengths. Compared to participants in the HW conditions, DB participants showed more significant reductions in thin-ideal internalization, body dissatisfaction, dieting, negative affect, and eating disorder symptoms when evaluated at post-test. They also showed greater reductions in negative affect at six-month and one-year follow-up, and psychosocial impairment at three-year follow-up. Compared to DB participants, HW participants showed significant decreases in risk for obesity onset at one-year follow-up and less weight gain through three-year follow-up. Overall, these findings indicate that DB programs produce stronger effects for eating pathology and risk factors, whereas HW programs appear to produce stronger effects for weight gain prevention.

Other research teams have also examined the utility of DB interventions in efficacy trials. Mitchell, Mazzeo, Rausch, and Cooke (2007) compared the effects of DB and yoga interventions with assessment only. Participants were 93 undergraduate women ( $M age = 19.56$ ,  $SD = 4.12$ ) who self-identified as having body image concerns. Women were randomly assigned to one of three groups: (1) a six-session DB intervention, (2) a six-session yoga group, or (3) an assessment only control group. Findings indicated that DB participants showed greatest reductions in ED symptoms, drive for thinness, body dissatisfaction, and alexithymia compared to assessment only controls. No significant changes were identified among participants in the yoga group.

**Effectiveness trials.** Findings from effectiveness studies indicate that DB interventions produce similar results when delivered by endogenous providers (i.e. peer leaders, school nurses, school counselors, health educators) in less controlled settings. For instance, Becker and associates have conducted several studies (Becker et al., 2008; Becker et al., 2005; Becker et al., 2006) examining whether a DB intervention adapted from Stice et al. (2000) would successfully reduce ED risk factors in members of college sororities.

Becker, Smith, and Ciao (2005) conducted a study in which they targeted members of campus sororities (who did and did not have body image concerns). This broader focus helped researchers examine whether DB interventions could be beneficial to women with different risk levels for eating pathology. Participants were 161 sorority members ( $M age = 19.95$ ,  $SD = .90$ ) randomized to either a two-session DB intervention, media advocacy (MA), or a wait list control group. Findings showed that members of both active treatment groups, DB and MA, reported greater decreases in dieting, body dissatisfaction, and ED symptomatology (at one month follow-up) than did members of the control group. However,

DB was the only condition that decreased thin-ideal internalization. Finally, results indicated that both active interventions were beneficial to higher- and lower- risk participants.

Becker et al. (2006), conducted another effectiveness trial among women ( $N = 90$ ,  $M age = 18.66$ ,  $SD = .62$ ) from six sororities, randomized to either a two session DB or MA condition. The participation of these women could be considered “semi-mandatory” as sorority members were required by their chapter to participate in the intervention groups. However, participants had the choice to come to the intervention but not complete questionnaires if they did not want to be involved in the study. Peers who had previously participated in either a DB or MA intervention from a previous study (Becker et al., 2005) led the intervention component. These peer-leaders completed nine hours of training (in either DB or MA) in facilitating the interventions. Results indicated that both interventions reduced BN symptoms at eight-month follow-up. Participants in the DB group, however, reported greater reductions in thin-ideal internalization, body dissatisfaction, and dieting compared to MA participants. Results of this study provided evidence that DB interventions could be delivered by peer-leaders effectively, supporting the disseminability of the program.

Becker et al., (2008) conducted a replication trial of the previous study, in which they examined the effectiveness of a two session peer-led DB and MA interventions in a larger sample ( $N = 188$ ;  $M age = 18.64$ ,  $SD = .63$ ) of sorority women. The sample included both higher and lower risk sorority members. Results indicated that both DB and MA reduced thin-ideal internalization, body dissatisfaction, dietary restraint, and bulimic pathology at eight-month follow-up. The study also revealed differential responses between high and low risk participants. Although both interventions appeared to be generally effective for higher risk participants, lower risk participants only benefited from the DB intervention. This is

important to note because many social systems (e.g. sororities) that operate within naturalistic conditions prefer to target both high and low risk participants simultaneously. Results from this trial indicate that DB programs can be effective when applied to mixed-risk samples, even though much of the initial research (efficacy trials) has been conducted with high-risk participants.

Becker et al. (2010) conducted another study in which they compared the effectiveness of two session peer-led DB and modified HW prevention programs among sorority members ( $N = 106$ ,  $Mean = 18.73$ ,  $SD = 0.72$ ). The goal of the study was to examine whether peer-leaders could facilitate a modified version of a HW eating disorder prevention program. They also sought to replicate previous findings regarding the utility of peer-facilitated DB programs. The HW program was modified based on feedback from a large number of previous HW participants who commented that the original HW program encouraged pursuit of the thin-ideal. Thus the program was modified to encourage pursuit of a healthy ideal (time was spent distinguishing between the healthy and thin-ideal). Results indicated that the DB program produced greater reductions in negative affect, thin-ideal internalization, and bulimic symptoms compared to the modified HW intervention at post-test. Both interventions yielded reductions in negative affect, thin-ideal internalization, body dissatisfaction, dietary restraint, and bulimic symptoms at 14 months. Authors of the study highlighted that the superior effects of DB at post-intervention indicate that DB programs may work more quickly than HW programs, although both appear to reduce ED risk factors at follow-up. There were no differences in ED risk factors between DB and modified HW at follow-up, indicating that differences in effects between these two interventions appear to diminish with time.

In another effectiveness trial, Matusek, Wendt, and Wiseman (2004) examined outcomes of adapted versions (one two-hour session) of DB and HW interventions in a sample of college women ( $N = 84$ ,  $M age = 19.86$ ,  $SD = 1.55$ ). These interventions were delivered by health educators working on campus. Participants were randomly assigned to one of three groups (DB, HW, or waitlist control). Findings indicated both interventions reduced thin-ideal internalization and ED symptoms at post-testing. However no effects were found for body dissatisfaction or negative affect. There were also no significant differences between the active interventions, indicating that the DB was not superior to the HW intervention.

In another investigation, Stice, Rohde, Gau, and Shaw (2011) examined whether a four session DB intervention could be delivered effectively by school staff (school nurses or counselors) to a sample of adolescent girls ( $N = 306$ ,  $M age = 15.7$ ,  $SD = 1.1$ ). Participants were randomized to either the DB intervention or a psychoeducational brochure control condition. Results indicated that participants randomized the DB condition showed greater decreases in thin-ideal internalization, body dissatisfaction, dieting attempts, and eating disorder symptoms at the end of the intervention than participants in the psychoeducational brochure control condition. The effects for body dissatisfaction, dieting, and eating disorder symptoms were maintained through one year follow-up. Overall, results suggest that DB interventions can be effectively delivered by endogenous providers with appropriate training.

**Limitations of dissonance-based research.** Despite multiple studies supporting the effectiveness of DB interventions for eating pathology, there are limitations in the research. Most notable of the limitations is the lack of information about whether results from efficacy and effectiveness trials generalize to individuals of diverse racial/ethnic groups. Although

samples for the above studies were racial/ethnically heterogeneous, all studies were still composed of primarily White samples. There were insufficient numbers of individuals from diverse populations to enable comparison of DB outcomes by racial/ethnic group. One article by Rodriguez, Marchand, Ng, and Stice (2008) examined how the effects of a DB program differed among Asian American, Hispanic, and White participants. Data were taken from an efficacy and effectiveness trial of a DB program. A total of 394 participants took part in the study. Participants were 13-20 year old females. Racial/ethnic breakdown of the sample was as follows: 79% White ( $n = 311$ ,  $M age = 16.4$ ,  $SD = 1.41$ ), 16% Hispanic/Latina ( $n = 61$ ,  $M age = 16.3$ ,  $SD = 1.43$ ), 8% Asian/Asian-American ( $n = 33$ ,  $M age = 17.0$ ,  $SD = 1.53$ ). Overall, results indicated that the DB intervention reduced eating disorder risk factors and eating disordered behavior for all three ethnic groups at post-test; there were no significant differences among groups in terms of response to the intervention. This study did not examine other racial/ethnic groups due to insufficient numbers. This study provides some evidence that DB interventions may be effective with individuals of diverse racial/ethnic groups; however more research is needed to determine whether these results apply to members of other racial/ethnic groups. Another limitation of DB programs is that their effects have been evaluated exclusively in samples of high school and college women. No studies have looked at whether these findings generalize to populations of older women.

### **Internet-Based Prevention**

Despite the effectiveness of DB interventions for eating pathology, these programs lack anonymity. Further, such programs are plagued by logistical problems such as scheduling conflicts for students and facilitators and time and space limitations. Such factors might increase attrition and make these programs difficult to deliver in a systematic way to

students at risk for eating pathology. Thus, there is a need for a more practical and convenient mode of intervention delivery. One possibility is an online approach. Online interventions address several of the limitations of face-to-face programming.

**Advantages and disadvantages of online delivery.** There are several advantages to web-based delivery of prevention programs. First, online delivery offers anonymity that is not possible in a face-to-face intervention (Miller & Gergen, 1998). This is especially relevant to eating disorder prevention because weight/shape concerns are often a significant source of shame for many individuals (Fairburn, Hay, & Welch, 1993). Individuals might be both more willing to participate and more self-disclosing if interventions were conducted online (Colon, 1997). Online interventions are also more practical because they remove or reduce geographic, time, and space constraints for both participants and administrators. Participants can communicate 24 hours a day, seven days a week via asynchronous communication (i.e. online discussion boards). An additional advantage of online delivery is that compliance with the program can be easily monitored via web-based tracking, thus making it easy to assess program adherence and outcomes associated with levels of participation (Zabinski et al., 2003).

Despite the advantages of online delivery, this mode of intervention has limitations. One disadvantage of online programs is that computer ownership is not universal (M. F. Zabinski et al., 2003); although the number of individuals who own a computer is increasing, computer ownership appears to be closely linked to education and income (Bucy, 2000; Chaudhuri, Flamm, & Horrigan, 2005). This problem is not as limiting for students on college campuses, as such individuals have public computers available for use. Additionally, many campuses require students to own a personal computer (Jones, 2002).



A potential concern regarding online DB programming is the absence of nonverbal cues in internet-based delivery. Nonverbal cues often provide information about the emotional context of messages being communicated (Zabinski et al., 2003). The impact of this limitation can be mitigated by encouraging the use of computer paralanguage (e.g. emotional bracketing) to denote particular emotional responses (e.g. inserting “(=)” or “<grin>” into text to represent smiling; Finfgeld, 2000). Another challenge of online-delivery is that users may have differing skill levels with technology. Some users may find the program easy to access and navigate because of prior experience with such technology; however, users with less computer experience may become frustrated with such a delivery format. This frustration, in turn, may affect their level of participation in the program. The impact of skill level could be reduced by providing detailed user training to ensure that participants understand how to navigate through the program (Zabinski et al., 2003).

Another concern about online interventions is that such a delivery format might present challenges to confidentiality. Although steps can be taken to promote security of online information (e.g. using a program that is password protected, providing users with anonymous usernames, automatic timed log-off, etc.; Zabinski et al., 2003), online security breeches can occur. Another concern about online delivery of intervention programs is that it is difficult to intervene in crisis situations. In face-to-face interventions facilitators have the opportunity to take specific actions should a concern about a participant’s safety or welfare arise; online interventions do not provide a medium for direct (i.e. in person) assessment of potential crisis situations. Despite this limitation, actions can be taken to reduce the likelihood of encountering such situations. Specifically, researchers can carefully screen participants for appropriateness prior to their enrollment in the online program, which could

reduce the likelihood of crises. Additionally, researchers can make sure to maintain extensive contact information for all participants should they need to take action to ensure an individual's safety (Zabinski et al., 2003).

**Types of communication.** There are several modes of communication that can be utilized in online interventions. Asynchronous communication is used in online interactions that do not involve a live component. Thus, at no point in the intervention are all participants required to “attend” the program simultaneously. An example of this type of communication is an online discussion board, where individuals are able to post information and react to others' posts without having to be online simultaneously. Such communication is flexible in that it allows individuals to communicate more freely without being constrained to specific timeframes. A drawback of this form of communication is that it does not provide for the type of active interaction that has often been shown to be effective in eating disorder prevention (Stice & Shaw, 2004).

Another type of online interaction is synchronous communication, which involves simultaneous communication. Online chatrooms are examples of synchronous communication. This type of communication is more interactive and better simulates face-to-face interactions because people are able to respond to what others say in real time (Zabinski et al., 2003).

**Online prevention programs for eating and weight behaviors.** Internet-based prevention has been shown to be effective with college populations (Gow, Trace, & Mazzeo, 2009; Low et al., 2006; Zabinski et al., 2001). For instance, the *Student Bodies (SB)* program is a structured, multimedia, internet-based program for the prevention of eating pathology that has garnered empirical support in numerous studies (Celio et al., 2000; Low et al., 2006;

Winzelberg et al., 1998; Winzelberg et al., 2000; Zabinski et al., 2001). This program targets college-aged women considered at-risk for eating disorders. The goal of the program is to reduce known eating disorder risk factors such as weight and shape concerns and unhealthy weight regulation behaviors (e.g. extreme dietary restriction, excessive exercise; Zabinski et al., 2001). The program is guided by Social Learning Theory (Bandura, 1986) and uses a self-help cognitive behavioral approach (Zabinski et al., 2001).

The *SB* program uses techniques from previous interventions by Cash (1991), Davis et al. (1989), and Taylor and Altman (1997). However, the online delivery format and interactive content are unique to the program. *SB* is a structured eight-week web-based program. The primary focus from week to week is improving participants' body images. The intervention begins by providing an overview and psychoeducation about the development and consequences of eating disorders. Other psychoeducational content includes a range of topics, including cultural determinants of beauty, media contributions, and cognitive-behavioral strategies for improving body satisfaction. The intervention uses psychoeducational readings, online self-monitoring, and behavior change exercises. Participants are given both mandatory and optional assignments, with adherence monitored electronically. Additionally, the program utilizes a moderated online discussion board, which serves as a forum for participants to give and receive emotional support and to discuss their reactions to program content. Participants are required to post one personal reaction per week and post one reaction to someone else's response (Zabinski et al., 2001).

Several studies of *SB* have yielded positive results. For instance, Winzelberg et al. (2000) examined the efficacy of the internet-based program compared to the control condition in a sample of 60 college women ( $M age = 20.0$ ,  $SD = 2.8$ ). Intervention

participants showed significant improvements in body image and decreased drive for thinness compared to control participants at three-month follow-up; however, no significant differences were observed at post-testing. Such results indicate that, although the program appeared to have a delayed effect, it was effective overall in promoting positive outcomes. In another study, Celio et al. (2000) compared the *SB* program and a classroom-delivered psychoeducational program (*Body Traps [BT]*) to a waitlist control condition (WLC) in a sample of 76 college women ( $M age = 19.6, SD = 2.2$ ). Results indicated that *SB* participants showed significant reductions at post-testing in weight/shape concerns and eating pathology compared to WLC participants. Reductions in disordered eating were maintained at four-month follow-up. Such reductions were not observed in *BT* participants.

In another study, Jacobi et al. (2007) adapted the *SB* program for use with women students ( $N = 100$ , 18-29 years) from two German universities. Results indicated that intervention participants ( $M age = 22.5, SD = 2.7$ ) showed decreased restraint, drive for thinness, and weight concerns relative to the WLC group ( $M age = 22.1, SD = 2.6$ ) at post-testing. Reductions in drive for thinness were maintained at three-month follow-up.

Given the evidence supporting the effectiveness of the asynchronous *SB* program, researchers have recently sought to examine whether an intervention utilizing synchronous communication would yield similar positive outcomes. Zabinski et al. (2001) conducted a small feasibility pilot trial of a seven-week synchronous online intervention with a sample of four women students who had subclinical eating pathology. Participants reported satisfaction with the interactive format. In addition, results suggested that the intervention might be effective in reducing body image concerns and eating pathology, although this sample was far too small to yield conclusions regarding effectiveness.

Nonetheless, following the encouraging findings of the pilot synchronous intervention (Zabinski et al., 2001), Zabinski, Wilfley, Calfas, Winzelberg, and Taylor (2004) examined the efficacy of synchronous interventions in a larger sample ( $N = 60$ ) of college women ( $M$  age = 18.9,  $SD = 2.4$ ). The eight-week synchronous online intervention that was developed was adapted from the *SB* program with the addition of synchronous, moderated chat sessions. Participants received weekly emails with brief psychoeducational readings about a range of topics (media, social comparison, cognitive restructuring, etc.) intended to increase knowledge about body image. Moderated chat sessions occurred once per week at a scheduled time and were an opportunity for participants to react to the content of the readings and to enhance their understanding of the material. Participants also received homework assignments (e.g. self-monitoring and cognitive restructuring), and were required to post their homework on the discussion board. In addition to the above components, moderators sent out weekly summaries of the chat sessions via email.

Results of the trial indicated that intervention participants manifested decreased eating pathology and increased self-esteem compared to waitlist control participants at 10 week follow-up. Compared to *SB*, the intervention produced comparable effects at post-test and larger effects at follow-up. Such results suggest that the addition of the synchronous component to the online program promotes larger effects than asynchronous communication alone. Further, participants rated the moderated chat sessions as preferable to the discussion boards (Zabinski et al., 2004).

In addition to showing promising results for body image and disordered eating, internet-based interventions have also been found to be effective in preventing weight gain during college. For example, Gow, Trace, and Mazzeo (2009) examined the utility of an

internet-based program for preventing weight gain among first year college students (41 men, 118 women, *M age* = 18.10). The study compared results of four different conditions: (1) no treatment, (2) six week weight and caloric feedback only, (3) six week internet intervention, and (4) six week combined feedback and internet intervention. Results indicated that the combined intervention group had lower BMIs at post-testing than the internet, feedback, and control groups. Individuals in the combined intervention group also reported reduced snacking behaviors after dinner. Taken together, results of these studies indicate that programs for preventing eating disorders and other weight related problems (e.g. weight gain, overweight and obesity) can be effectively adapted for online delivery and yield positive outcomes.

## **Summary**

Eating pathology is a common problem that is associated with a range of negative medical and psychological outcomes (de Zwaan & Mitchell, 1993; Gleaves et al., 1998; Godart et al., 2000; Godt, 2002; Johnson et al., 2002; Sharp & Freeman, 1993). College women manifest especially high rates of various forms of eating pathology (Kirk et al., 2001; Malinauskas et al., 2006; Mintz & Betz., 1988; Saules et al., 2009). Because full syndrome eating disorders are often chronic and there are few effective treatment for these conditions, prevention of eating disordered behavior remains a priority. Multiple empirical studies suggest that dissonance-based prevention programs are the most successful in reducing eating disorder risk factors (Stice & Shaw, 2004; Stice, Shaw, et al., 2008; Stice et al., 2007). However such programs require significant university mental health resources, including administration by trained mental health professionals. Further, such programs might not be convenient for students who are limited by scheduling restraints or geographic proximity.

Adapting a dissonance-based program for online use might yield similar reductions in eating disorder risk factors while being more convenient for both participants and administrators.

Thus, this study evaluated the effectiveness of an internet-based dissonance program for the prevention of eating pathology among college women. Participants were randomly assigned to one of three groups: (1) an internet-based dissonance intervention, (2) a face-to-face dissonance intervention, or (3) an assessment only control group.

### **Hypotheses**

Based on results from existing literature, it was hypothesized that participants in the face-to-face and online dissonance interventions would report greater decreases in thin-ideal internalization, body dissatisfaction, eating disorder symptoms, dieting, and negative affect at post-testing, relative to participants in the assessment only control group. No a priori hypotheses were made regarding differences between the face-to-face and online dissonance interventions because of the lack of extant research examining the online delivery of dissonance-based interventions.

## **Method**

### **Participants**

Participants were 343 undergraduate women between the ages of 18 and 25 who were recruited from the Introduction to Psychology (PSYC 101) subject pool at Virginia Commonwealth University (VCU). After completing baseline assessments, participants were randomized as follows to one of three conditions: assessment control ( $n = 114$ ), face-to-face intervention ( $n = 114$ ), or the online intervention ( $n = 115$ ). Ethnic breakdown of the sample was as follows: 43.4% White ( $n = 149$ ); 30.0% Black/African American ( $n = 103$ ); 5.8% Hispanic/Latina ( $n = 20$ ); 7.9% Asian/Asian American ( $n = 27$ ); 9.9% Multiracial

(participants indicated more than one category) ( $n = 34$ ); 2.9% “Other” ( $n = 10$ ).

Participants’ mean age was 18.81 ( $SD = 1.37$ ) years. Their mean BMI was 23.90 ( $SD = 5.01$ )  $\text{kg/m}^2$ . Class breakdown of the sample was as follows: 67.6% ( $n = 232$ ) freshman; 59% ( $n = 59$ ) sophomore; 10.2% ( $n = 35$ ) junior; 4.1% ( $n = 14$ ) senior; 0.9% ( $n = 3$ ) graduated. Most participants were not in a sorority (96.8%). Approximately 54% of participants reported feeling dissatisfied with their body and 66.2% wished they were thinner. Men were excluded from this study because the prevalences of AN and BN in men are low (American Psychiatric Association, 2000a) and because Stice’s dissonance intervention has been evaluated on women exclusively (Stice, Shaw, et al., 2008). Students were given course credit for their participation.

**Identification, screening, and informed consent procedures.** Participants were recruited from Psychology 101 classes. The study was advertised as an intervention for women who have concerns about their weight and/or shape. Informed consent was obtained prior to distribution of baseline assessments. During informed consent, participants were notified that they could withdraw from the study at any time. Participants were subsequently notified via email of their inclusion/exclusion status and group assignment. There was a brief delay (1-3 weeks) between participants’ completion of baseline questionnaires and randomization to groups because of the time needed to recruit study participants.

This study aimed to recruit at least 55 participants who completed the intervention for each of three conditions, which would yield power  $\geq .80$ , based on  $\alpha \leq .05$  and assuming a small effect size (i.e.  $f = 0.25$ ; Cohen, 1977). However, the goal was to recruit approximately 201 participants (67/ condition) from the Psychology 101 subject pool to account for participant attrition. Based on previous studies conducted with this population (Gow et al.,



2009; Mitchell et al., 2007), it was estimated that approximately 20 % of participants would drop out of the study before post-testing (approximately 12 drops outs per condition).

However, attrition for current study was higher than in previous studies conducted with this population (36.2 % for the current sample), so more participants were recruited than was originally proposed.

A total of 443 participants were originally screened to participate in the intervention phase of the study. Participants were determined to be ineligible for the intervention phase if they did not have an available timeslot to participate in both the face-to-face and internet interventions (as participants could be assigned to either group). Further, because this study was focused on prevention of eating pathology rather than treatment, participants were excluded if they met diagnostic criteria for a clinical eating disorder (AN, BN) or BED based on their responses to the eating disorder screening (EDDS; E. Stice, Telch, & Rizvi, 2000) conducted at baseline. This screening measure assesses eating pathology based on DSM-IV-TR criteria and categorizes participants into potential full threshold and subthreshold eating disorder diagnoses (AN, BN, and BED). For the purposes of this study, only individuals with full threshold diagnoses of AN, BN, or BED were excluded from participation, as the intervention was designed to target individuals at increased risk for developing full threshold eating pathology (including individuals with subthreshold eating disorder symptoms). A total of 100 participants were excluded from participation in the intervention component of the study. Thirty-five of these participants were excluded due to unavailability, with the remaining 65 participants excluded because they met criteria for full threshold EDs based on the screening measure (AN = 4 [0.9%], BN = 50 [11.3%], BED = 11 [2.5%]). Most of the participants excluded were ineligible because they met criteria for BN.

A higher than expected number of participants were excluded from the study because they met criteria for a clinical eating disorder based on the EDDS screening measure. Despite exceeding this EDDS cutoff, it is unlikely that all of the participants excluded met full *DSM-IV* criteria for an eating disorder. One possible reason that more individuals were excluded from this study compared with previous investigations is that the present study utilized the EDDS, a self-report screening measure as opposed to diagnostic interviews that offer more opportunity for clarification of reported symptoms. EDDS items do not allow participants to clarify the nature of specific eating disorder symptoms assessed. For example, item 18 on the EDDS (the item that contributed to many participants meeting criteria for full threshold BN) asks “how many times per week on average over the past 3 months have you engaged in excessive exercise specifically to counteract the effects of overeating episodes?” There is nothing in the measure to specify what level of exercise is considered “excessive.” Thus, individuals endorsing this screening item may interpret “excessive exercise” very differently, with some participants considering moderate levels of exercise to be “excessive.” The lack of specifiers may have resulted in many participants overreporting eating disorder symptoms. Regardless, all participants meeting criteria for an eating disorder based on this measure were screened out of the study because it was not possible to determine which participants may have been overreporting symptoms. Participants were notified via email about their inclusion/exclusion status after baseline questionnaires were completed and scored. Participants determined ineligible due to eating disorder symptomatology were provided referral resources.

**Research setting.** Participants completed baseline and post-test measures in person. The online intervention itself was administered through a secure website called Online

Institute. The face-to-face intervention took place in classrooms on the VCU campus. Because the interventions potentially addressed sensitive issues for participants, the researcher was available via email to aid participants with difficulties.

## **Procedure**

A three-arm pretest post-test control group design was used in the current study (Shadish, Cook, & Campbell, 2002). Upon completing pretest measures, participants were randomly assigned (using a random number generator) to one of the following conditions: (1) assessment only control group, (2) face-to-face dissonance intervention, or (3) online dissonance intervention. This experimental design minimizes potential threats to both internal and external validity. In particular, collecting baseline measures enables the researcher to control for participant pretest scores on the dependent measures, thus controlling for differences that may be present between groups at baseline assessment. Additionally, using random assignment eliminates several of the threats to internal validity such as maturity and regression to the mean. Further, this study design provides for the control of history and maturation effects because all groups are evaluated at post-testing (Shadish et al., 2002).

**Project timeline.** Recruitment for the study took place over the course of three semesters (Spring 2010, Fall 2010, Spring 2011). Participants were screened for eligibility and then randomized to groups in four different waves. A total of 10 face-to-face and 10 online groups were conducted across the different waves. Group sizes varied from five to 15 participants per group at first session. It should be noted that differences in group size were largely an effect of variations in participants' availability to attend at specific days and times.

**Assessment only control.** Participants in the assessment only control group completed baseline and post-test measures. They did not receive any intervention.

**Face-to-face intervention.** The face-to-face dissonance-based intervention was based on the dissonance program developed by Stice and colleagues (Stice, Mazotti, et al., 2000). The intervention is grounded in cognitive dissonance theory (outlined by Festinger, 1957). Dissonance theory posits that if there is a discrepancy between one's beliefs and actions, individuals are likely to change their beliefs because of the psychological distress that comes from performing discrepant actions. Thus, this intervention uses a sequence of interactive verbal, written, and behavioral exercises that leads participants to take a stance against the thin-ideal. Specifically, participants began the intervention by collectively defining the thin-ideal, and discussing how it is perpetuated, costs of pursuing it, and ways in which individuals can decrease their adherence to such unrealistic standards. The program incorporated group discussions, role-plays, and homework. Homework assignments were de-identified and collected by group facilitators to increase the group members' accountability. Three one-hour sessions were administered by two trained facilitators (graduate students in either the Counseling or Clinical Psychology doctoral programs at Virginia Commonwealth University). A majority of group facilitators (for both interventions) were masters level clinicians who were knowledgeable of body image and eating disorder issues. Some facilitators did not have a master's degree, but these facilitators were paired with co-facilitators who had previously implemented the intervention.

**Internet intervention.** Session content for the internet delivered intervention was identical to the face-to-face intervention except where it was necessary to make additions to the text to facilitate online communication. For instance, group members would often be

instructed to type “yes” if they understood what group leaders were trying to convey (e.g. typing “yes” if they were in agreement with group rules). No actual content from the original intervention was changed for the online program. The online sessions consisted of a series of three, synchronous, online discussions lasting one hour each. Sessions were moderated by two trained facilitators (doctoral students in Counseling or Clinical Psychology). To promote consistency with the face-to-face intervention, group members were asked to email homework assignments to the research coordinator (without identifying information). No content from the online intervention (including homework) was available between sessions.

Although different options were considered to implement components of the online intervention (e.g. having participants post homework assignments on an asynchronous discussion board in addition to participating in moderated discussions), this study only utilized synchronous moderated discussions to facilitate components of the intervention because it was reasoned that this delivery format would encourage interaction among participants that would more closely resemble those outlined in the original manual (Stice, Mazotti, et al., 2000) for the face-to-face intervention. Group leaders were encouraged to facilitate groups in the same manner as the face-to-face intervention. For example, in the face-to-face intervention, participants are specifically called upon to complete role plays, thus ensuring that as many group members participate as possible (Stice, Mazotti, et al., 2000). The moderators of the online group utilized the same approach in facilitating discussion by calling upon participants and making sure as many group members participated as possible.

The intervention itself was delivered through a secure online program called the Online Institute. The online program was pilot tested by graduate students in Clinical and

Counseling psychology after the session manual had been adapted and the online system had been set up. Two pilot sessions lasting an hour each were conducted, with seven or eight pilot participants logging on to participate. Feedback was given and the session manual was adapted based on suggestions of pilot participants (e.g. making online instructions clearer, changing settings in online program to facilitate clearer communication, etc.).

**Facilitator training and supervision.** Facilitators for both the face-to-face and online groups completed a 2.5 hour training session with the principal investigator for this project. One hour was spent providing an overview of the intervention background, philosophy, and manual. The second hour was spent with group facilitators practicing delivery of intervention components (e.g. practicing delivery of role plays and discussion topics) on each other. The last half hour was spent answering facilitator questions about the manual, intervention philosophy, delivery, etc. Group leaders for the online intervention completed an additional hour of training in administration of the intervention through the online system. Training included instructions about how to logon and navigate the chat room. Online leaders also practiced facilitating a role play online. It should be noted that although efforts were made to have group leaders lead only one type of group (i.e. only online or face-to-face groups and not both), difficulties recruiting group leaders necessitated having several leaders lead both types of groups. Group leaders received weekly supervision in session delivery from both the project coordinator (author of this proposal) and principal investigator (Dr. Suzanne Mazzeo).

**Intervention adherence.** To evaluate group leaders' adherence to the manual for the dissonance intervention, face-to-face group sessions were audio recorded and transcripts were saved from the online intervention group. Outside ratings of adherence were conducted

on a randomly selected 25% of the face-to-face and online dissonance sessions by trained undergraduate students blind to the study's hypotheses. These raters evaluated whether group leaders facilitated discussion around a certain number of target topics (rated as did or did not occur). Additionally, the number of role plays that occurred in sessions two and three was coded.

**Participant compensation.** All participants received one hour of research credit for completing baseline and post-test questionnaires (totaling to two research credits). Members of either the face-to-face or online intervention groups received one hour of research credit for each intervention session attended (totaling to three credits for intervention attendance). Further, participants received one research credit if they completed all homework assignments associated with the intervention. Both intervention groups received up to six credits for participation in all parts of the study, including post-intervention questionnaires. The control group completed pretest and post-test measures (without treatment in the interim) and received two credits for their participation.

## **Measures**

**Demographic Questionnaire (see Appendix A).** Participants were asked to provide information about their age, year in school, ethnicity, and sorority status. Individuals were also asked to provide their height and weight (used to calculate BMI), as well as lowest and highest weights. Further, participants completed dichotomous items assessing whether they were dissatisfied with their body and wished they were thinner.

**Eating Disorder Diagnostic Scale (EDDS; Appendix B).** The EDDS is brief self-report scale that assesses DSM-IV-TR criteria for eating disorder symptomatology (Stice, Telch, et al., 2000). It consists of 22 items, with scores providing information on potential

diagnoses for all three clinical eating disorders (AN, BN, and BED), as well as a composite score for eating disorder symptoms. Scores on this scale have been shown to be in high agreement ( $k = .78-.83$ ) with diagnoses provided by the Eating Disorder Examination (EDE; C. G. Fairburn & Cooper, 1993), as well as for the Structured Clinical Interview for DSM-IV (Spitzer, Williams, Gibbon, & First, 1990). Further, the measure manifests adequate internal consistency (Cronbach's  $\alpha = .89$ ), and temporal stability (one week test-retest reliability,  $r = .87$ ). Finally, the EDDS has shown predictive validity for the onset of eating disorder symptoms (Stice, Fisher, & Martinez, 2004; Stice, Telch, et al., 2000). In the current study, this measure yielded internally consistent scores (Cronbach's  $\alpha = .79$ ).

**The Ideal-Body Stereotype Scale-Revised (IBSS-R; Appendix C).** The IBSS-R was used to measure thin-ideal internalization (Stice, Schupak-Neuberg, Shaw, & Stein, 1994). This scale has six items that assess individuals' adherence to the thin-ideal of feminine beauty. Response options range from (1) *strongly disagree* to (5) *strongly agree*. This measure has shown good internal consistency (.91), three week test-retest reliability ( $r = .80$ ), and predictive validity for onset of bulimic symptoms (Stice et al., 1994). However, initial analyses examining reliability in the current study revealed that item five on the measure detracted from the overall alpha (.71) of the scale. A similar finding related to this item has been observed in a previous study with this population (Mitchell et al., 2007). As was done with the previous study, item five was dropped from the overall score to improve the measure's internal consistency. With item five excluded, Cronbach's  $\alpha$  for the current study was .78.

**Multidimensional Body Self-Relations Questionnaire (MBSRQ; Appendix D).** The Appearance Evaluation (AE) subscale of the MBSRQ was used to assess body



dissatisfaction. This is a seven item subscale with items being rated on a five point scale ranging from (1) *definitely disagree* to (5) *definitely agree*. Lower scores on the scale indicate greater body dissatisfaction. This subscale has been found to yield internally consistent (Cronbach's  $\alpha = .88$ ; Brown, Cash & Mikulka, 1990) and stable scores (three month test-retest reliability,  $r = .91$ ; Cash, 1994). The MBSRQ-AE also shows good reliability in assessing body dissatisfaction (Cash & Hicks, 1990). In the current study, the MBSRQ-AE showed internally consistent scores (Cronbach's  $\alpha = .87$ ).

**Body Esteem Scale (BES; Appendix E).** The BES was used as a measure of body dissatisfaction (Franzoi & Shields, 1984). This scale consists of 35 items in which individuals rate their level of satisfaction with different parts and functions of their body. Response options range from (1) *have strong negative feelings* to (5) *have strong positive feelings*. The scale consists of three subscales, including sexual attractiveness, weight concern, and physical condition. This measure has adequate internal consistency (Cronbach's  $\alpha = .78$  [sexual attractiveness],  $.87$  [weight concern],  $.82$  [physical condition]; (Franzoi & Shields, 1984), and three month test-retest reliability ( $r = .81$  [sexual attractiveness],  $.87$  [weight concern],  $.75$  [physical condition]; Franzoi, 1994). Further, the scale shows good discriminant validity for distinguishing women with anorexia from those without this condition (Franzoi & Shields, 1984). In the current study, internally consistent scores were observed for the sexual attractiveness (Cronbach's  $\alpha = .84$ ), weight concerns (Cronbach's  $\alpha = .88$ ), and physical condition (Cronbach's  $\alpha = .87$ ) subscales.

**Dutch Restrained Eating Scale (DRES; Appendix F).** The DRES was used to assess dieting (van Strien, Frijters, van Staveren, Defares, & Deurenberg, 1986). It has 10 items that evaluate frequency of dieting behaviors. Responses range from (1) *never* to (5)

*always*. Research indicates that the DRES yields internally consistent scores (Cronbach's  $\alpha = .95$ ). Further, the measure shows adequate test-retest reliability over a two-week period ( $r = .82$ ). Additionally, the DRES manifests convergent validity with measures of caloric intake, and has predictive validity for the onset of bulimic symptomatology (van Strien et al., 1985; Stice, Fisher et al., 2004). In the current study, internally consistent scores were observed for the DRES (Cronbach's  $\alpha = .95$ ).

**Positive Affect and Negative Affect Scale-Revised Form (PANAS-X; Appendix G).** Negative affect was measured using the PANAS-X (Watson & Clark, 1992). The PANAS-X is a 60 item scale examining 11 different emotional states (positive and negative), including fear, sadness, guilt, hostility, shyness, fatigue, surprise, joviality, self-assurance, attentiveness, and serenity. For the purposes of this study, only the items assessing negative affect (those on the fear [six items], sadness [five items], guilt [six items], and hostility [six items]) subscales were used. Participants indicate the extent to which they have felt a variety of negative emotional states over a specific time period. This measure provides a range of specified time frames that can be chosen. For the purpose of this study, the time frame chosen was "past few weeks." Response options range from (1) *very slightly or not at all* to (5) *extremely*. This measure has previously yielded internally consistent scores, with Cronbach's  $\alpha$  ranging from .85 to .90 depending on the time frame examined. Further, the scale shows adequate test-retest reliability over a three-week period ( $r = .71$ ; Watson & Clark, 1992). Additionally, it has manifested convergent validity with other measures of depression, anxiety, and hostility (Watson & Clark, 1992) as well as predictive validity for the onset of bulimic symptoms (Stice et al., 2003). In the current study, the PANAS-X showed internally consistent scores (Cronbach's  $\alpha = .94$ ).

## **Data Analysis**

All data were double entered to ensure accurate data entry. Data were also examined to make sure all scores were within range and there were no outliers or data entry errors. All data were checked for normality. One-way analyses of variance (ANOVAs) were used to examine whether the two intervention groups and the assessment only group differed significantly on any of the outcome variables at baseline. Chi-square tests of independence were also conducted to examine whether groups differed on categorical variables such as race/ethnicity, year in school, etc. Study hypotheses were examined using a series of repeated measures analyses of covariance (ANCOVAs) with baseline scores on the dependent measures and BMI entered as covariates. ANCOVA is a statistical technique that is useful in intervention research because it enables the researcher to control for individual differences in scores at baseline, thus reducing error variance (Huck & McLean, 1975). For the purpose of these analyses, time of assessment served as the within-subjects variable, and group assignment (face-to-face intervention, online intervention, assessment only control) served as the between subjects variable. Outcomes were the scores on the dependent measures at post-testing. Of note, use of multiple analyses of covariance (MANCOVAs), instead of ANCOVAs, was considered, but this was not feasible due to insufficient power. In addition to the main analyses, exploratory ANCOVAs were also conducted examining how intervention dosage (number of sessions attended, number of homework assignment completed) related to outcomes. All data were checked to see if statistical assumptions were met for ANCOVA analyses. Chi-square analyses were also conducted to determine whether rates of attrition differed by group assignment.

**Intent-to-treat analysis.** Statistical analyses were performed with a modified intent-to-treat (MITT) approach. Traditional intent-to-treat analyses used in randomized clinical trials involve analyzing participants in a study according to their original randomization, regardless of whether they actually complete the intervention (Hulley et al., 2001). Thus, the most recent data collected for each participant is used for post-intervention scores (Spilker, 1991) with this approach. For instance, if a participant does not complete the post-intervention assessment, their pretest scores are then used in the post-intervention analyses. The intent-to-treat approach is frequently utilized because it protects against threats to validity from attrition (Spilker, 1991). MITT is a less conservative variation of the intent-to-treat principle in which some participants who were originally randomized are excluded from analyses for a justifiable reason. It is a highly utilized approach being used more frequently in randomized clinical trials (Abraha & Montedori, 2010).

MITT is especially appropriate for pilot studies where the intention is to determine whether a new intervention (or mode of delivery) may have potential for efficacy given further refinements. MITT is relatively conservative in accounting for intervention adherence (including pretest data from some participants that dropped out) but is not so conservative that it includes participants who may have dropped out of the study for a justifiable reason unrelated to the treatment itself (Abraha & Montedori, 2010). Despite the fact that previous studies have examined the efficacy of dissonance-based eating disorder interventions, the current study is considered a pilot because it is the first to examine an entirely new mode of delivery. Thus, MITT is the most appropriate type of analysis. MITT takes into account intervention adherence (with pretest scores being used for post-intervention analyses for participants that attended at least one session but dropped out of the study before posttest),

without including baseline measures for participants who probably dropped out the study for reasons unrelated to the intervention (e.g. some students were probably not interested in actually attending the intervention but wanted to get research credit for completing baseline questionnaires).

## **Results**

### **Baseline Analyses**

Analyses were conducted to determine whether there were any significant differences among groups on the outcome measures at baseline. One-way analyses of variance (ANOVAs) did not reveal any significant group differences on the continuous outcome measures. Chi-square analyses were also performed to examine whether groups differed on categorical variables such as race/ethnicity, year in school, and sorority membership. Results did not indicate any significant group differences. Further, chi-square analyses showed no significant differences among groups in participants' endorsement of feeling dissatisfied with their bodies or desire to be thinner.

### **Analyses of Attrition and Intervention Compliance**

Of the participants randomized to conditions ( $N = 343$ ), a total of 209 (60.9%) completed post-test questionnaires. However, some participants who completed posttest questionnaires ( $n = 10$ ) were assigned to an intervention group but did not attend an intervention session or complete any homework. Because these participants did not receive any actual dosage of the intervention, they were excluded from all post-intervention analyses (see Figure 1 for an overview of sample sizes throughout the project). Thus, a total of 199 participants were included in analyses examining post-intervention effects. Chi-square analyses were conducted to determine if completion of post-test questionnaires differed by

condition. Results did not indicate significant differences in post-test completion among groups. Independent samples t-tests examined whether there were differences in baseline scores for individuals who did and did not complete post-test questionnaires. Results indicated that there was a significant difference between completers and non-completers,  $t(331) = 2.15, p = .03$ . Specifically, those who did not complete posttest questionnaires had higher baseline scores on the IBSS-R ( $M = 3.61, SD = .67$ ) than individuals who completed post testing ( $M = 3.45, SD = .65$ ). Results were non-significant for all other variables. Independent samples t-tests also examined whether individuals who received some form of the intervention (i.e. attended at least one session) differed at baseline from individuals who dropped out of the study after randomization. No significant differences were observed between those individuals who attended at least one session and those that did not. Further, independent samples t-tests did not indicate any significant differences in baseline scores between individuals who attended all three sessions and participants who attended two or fewer sessions.

Among intervention participants, 26.6% did not attend any sessions after randomization. Chi-square analyses indicated that dropout after randomization did not differ significantly between the two intervention groups. Attendance for each of the sessions (all intervention participants combined) was as follows: 65.1% attended session one; 58.1% attended session two; and 54.6% attended session three. Further, 41.5% of intervention participants attended all sessions of the intervention. Chi-square analyses did not show significant differences between groups for specific session attendance. There were also no significant differences between groups in the percentage of participants who attended all sessions.

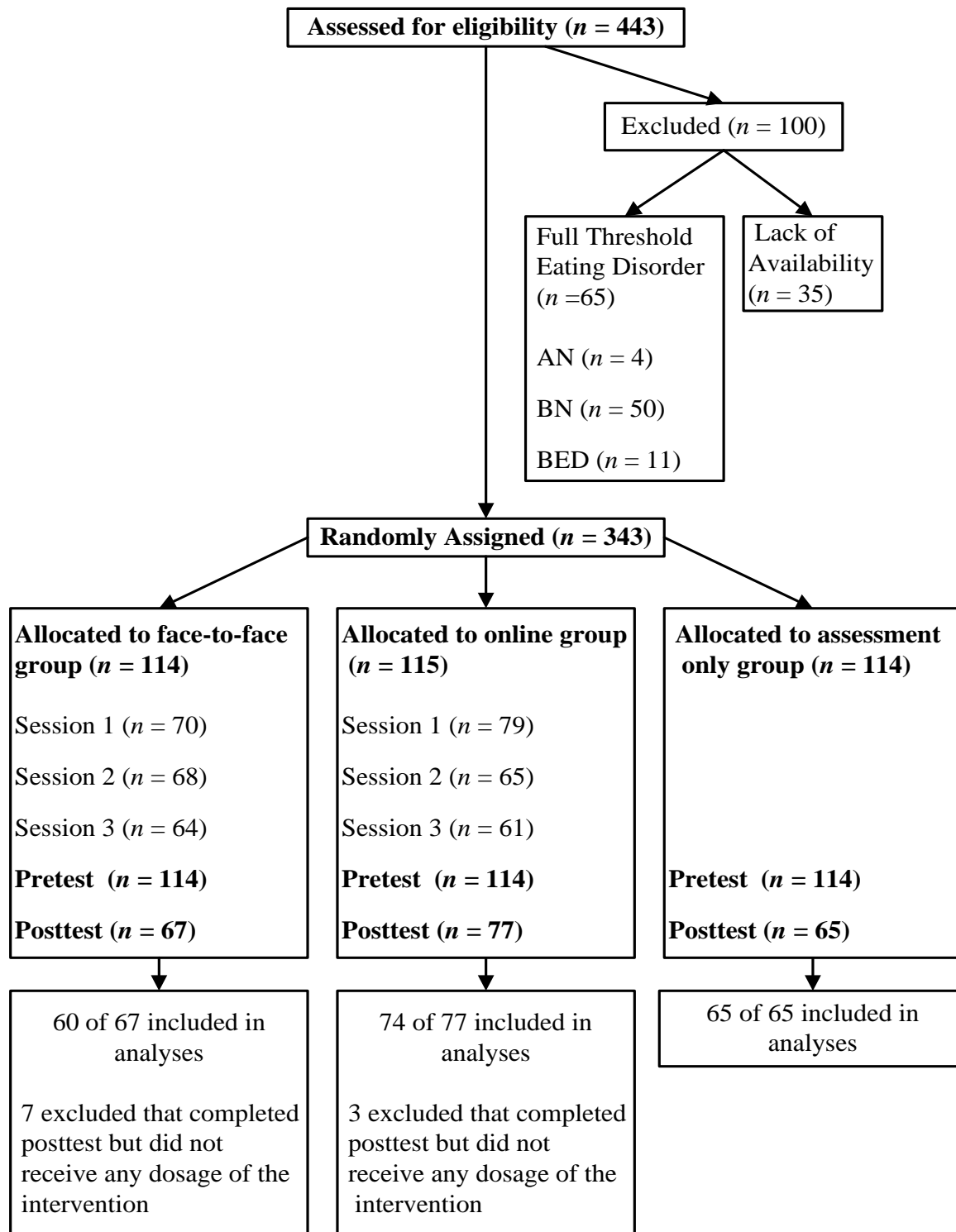


Figure 1. Participant Flow Chart

Analyses also examined rates of homework completion among intervention participants. Approximately 28% of intervention participants completed all homework assignments associated with the groups. Homework completion for each session was as follows: 53.3% completed week one's homework; 54.1% completed week two's homework; and 31.4% completed week three's homework. Approximately 39% of intervention participants did not complete any homework assignments. Chi-square analyses did not reveal any significant differences between conditions for specific session homework completion. Further, there were no group differences in the overall percentage of participants who completed all homework assignments. Table 1 provides percentages of session attendance and homework completion by group

Table 1.

*Frequency (percentage) session attendance and homework completion by group*

	Assessment Only	Face-to-Face	Online
Session 1 Attended	---	70 (65.4%)	79 (70.5%)
Session 2 Attended	---	68 (63.6%)	65 (58.0%)
Session 3 Attended	---	64 (59.8%)	61 (54.5%)
All Sessions	---	52 (48.6%)	43 (38.4%)
Week 1 Homework	---	64 (59.8%)	58 (51.8%)
Week 2 Homework	---	63 (58.9%)	61 (54.5%)
Week 3 Homework	---	32 (29.9%)	40 (35.7%)
All Homework	---	30 (28.0%)	35 (31.3%)



## Baseline to Post-Intervention Analyses

**MITT analyses.** Analyses were conducted using the MITT approach described previously. This type of analysis involves substituting baseline scores for post-intervention assessment scores for individuals who received some dose of the intervention but did not complete post testing ( $n = 40$ ). All data were checked to make sure statistical assumptions were met. These analyses revealed that two variables (IBSS-R and MBSRQ) violated the assumption of homogeneity of regression slopes. Analyses were performed to determine if there were any group differences at baseline that would render ANCOVA inappropriate. Findings did not reveal any group differences in baseline outcomes or BMI. Thus, based on the recommendations of Tabachnick and Fidell (2007), traditional ANCOVA analyses were conducted for these variables because of the relative robustness of ANCOVA when there is no suspected interaction between independent variables and covariates. All other statistical assumptions were adequately met.

One-way ANCOVAs indicated that there were post-intervention effects for subscales assessing body dissatisfaction, after controlling for the effect of pretest scores and BMI. Specifically, differences were found for the Sexual Attractiveness subscale of the BES (BES-SA),  $F(2, 234) = 4.55, p = .01$ , partial  $\eta^2 = .04$ . Tukey LSD post hoc analyses indicated that there were higher scores for face-to-face group ( $M = 50.38, SE = .56$ ) compared with the assessment only group ( $M = 47.85, SE = .62$ ). No significant differences were observed between the online ( $M = 49.33, SE = .51$ ) and assessment only conditions. Further, there were no significant differences between the face-to-face and online intervention groups. Differences were also found for the Weight Concerns subscale of the BES (BES-WC),  $F(2, 234) = 7.82, p = .00$ , partial  $\eta^2 = .06$ . Post hoc analyses revealed that there were higher

scores for the face-to-face ( $M = 32.96$ ,  $SE = .62$ ) and online ( $M = 32.52$ ,  $SE = .57$ ) groups compared with the assessment only group ( $M = 29.54$ ,  $SE = .69$ ). No significant differences were found between the intervention groups. Participants in the face-to-face ( $M = 31.80$ ,  $SE = .48$ ) and online ( $M = 31.48$ ,  $SE = .45$ ) groups also had higher scores than the assessment only group ( $M = 29.81$ ,  $SE = .54$ ) on the Physical Condition subscale of the BES (BES-PC),  $F(2, 234) = 4.15$ ,  $p = .02$ , partial  $\eta^2 = .03$ , with post hoc analyses revealing no significant differences between intervention groups. Additionally, differences were found between groups on the MBSRQ,  $F(2, 234) = 3.03$ ,  $p = .05$ , partial  $\eta^2 = .03$ . Post hoc analyses showed that the assessment only group ( $M = 24.28$ ,  $SE = .41$ ) had lower scores (indicative of higher body dissatisfaction) than the face-to-face ( $M = 25.48$ ,  $SE = .37$ ) and online ( $M = 25.43$ ,  $SE = .34$ ) groups. No significant differences were found between intervention groups on body dissatisfaction. Thus, these findings indicate that both intervention groups were significantly different from the assessment only group on most scales assessing body dissatisfaction (the exception being the SA scale of the BES for which differences were observed for the face-to-face and not the online intervention). Results were nonsignificant for all other variables, including restraint (DRES), negative affect (PANAS-X), thin-ideal internalization (IBSS-R), and eating disorder symptoms (EDDS). Table 2 provides baseline and post-intervention means for all measures.

Table 2.

*Baseline and post-intervention MITT means by group*

			Assessment Only		Face-to-Face		Online	
	<i>F</i>	<i>p</i>	Baseline mean (SD)	Post mean (SE)	Baseline mean (SD)	Post mean (SE)	Baseline Mean (SD)	Post mean (SE)
IBSS-R	1.56	.21	3.57 (.57)	3.44 (.06)	3.49 (.65)	3.29 (.06)	3.48 (.74)	3.33 (.05)
BES-SA	4.55	.01*	48.54 (7.76)	47.85 (.62)	48.18 (8.44)	50.38 (.56)	47.12 (7.95)	49.33 (.51)
BES-WC	7.82	.00**	29.74 (9.19)	29.54 (.69)	28.89 (8.44)	32.96 (.62)	28.34 (8.70)	32.52 (.57)
BES-PC	4.15	.02*	31.14 (6.92)	29.81 (.54)	29.21 (6.81)	31.80 (.48)	29.04 (7.06)	31.48 (.45)
MBSRQ	3.03	.05*	23.25 (5.39)	24.28 (.41)	23.98 (6.16)	25.48 (.37)	23.47 (5.56)	25.43 (.34)
DRES	2.49	.09	2.61 (.92)	2.41 (.07)	2.64 (1.07)	2.21 (.07)	2.50 (1.02)	2.24 (.06)
PANAS-X	2.26	.11	1.91 (.78)	1.83 (.07)	1.93 (.75)	1.65 (.06)	1.88 (.74)	1.69 (.05)
EDDS	1.69	.19	19.61 (11.89)	17.34 (.94)	20.88 (13.22)	15.29 (.85)	19.51 (11.58)	15.30 (.78)

\*  $p < .05$ \*\*  $p < .01$

**Non-ITT analyses.** Given the pilot nature of this study, analyses were also conducted exclusively based on those individuals who completed post-testing ( $n = 199$ ). These analyses provide information about group effects when individuals adhere to the intervention. All data were checked to make sure statistical assumptions were met. As with MITT analyses, significant differences were observed for all variables assessing body dissatisfaction (all subscales of the BES and the MBSRQ). Specifically, individuals in both intervention groups had higher scores on all subscales of the BES. These subscales included SA,  $F(2, 194) = 5.90, p = .00$ , partial  $\eta^2 = .06$ , WC,  $F(2, 194) = 11.64, p = .00$ , partial  $\eta^2 = .11$ , and PC,  $F(2, 194) = 4.78, p = .01$ , partial  $\eta^2 = .05$  (see Table 3 for baseline and post intervention means by group). When analyses were conducted using a non-ITT approach, differences were observed between the assessment only group and both intervention groups for the BES-SA subscale, whereas with MITT analyses there was only an effect for the face-to-face group. Differences were also observed for the MBSRQ,  $F(2, 194) = 4.78, p = .01$ , partial  $\eta^2 = .05$ . In addition to the effects observed for body dissatisfaction, significant differences were found between the assessment only and both intervention groups for all other variables (IBSS-R,  $F[2, 194] = 3.11, p = .05$ , partial  $\eta^2 = .03$ , DRES,  $F[2, 194] = 5.09, p = .01$ , partial  $\eta^2 = .05$ , PANAS-X,  $F[2, 194] = 3.20, p = .04$ , partial  $\eta^2 = .03$ , EDDS,  $F[2, 194] = 3.60, p = .03$ , partial  $\eta^2 = .04$ ) when analyses were conducted using a non-ITT approach. Specifically, intervention participants had lower scores on thin-ideal internalization (IBSS-R), dietary restraint (DRES), and negative affect (PANAS-X), and reported fewer eating disorder symptoms (EDDS) compared with assessment only participants (see table 3 for baseline and post intervention means by group). Post hoc analyses did not identify any significant differences between the two intervention groups for any variables.

Table 3.

*Baseline and post-intervention non-ITT means by group*

			Assessment Only		Face-to-Face		Online	
	<i>F</i>	<i>p</i>	Baseline mean (SD)	Post mean (SE)	Baseline mean (SD)	Post mean (SE)	Baseline Mean (SD)	Post mean (SE)
IBSS-R	3.11	.05*	3.57 (.57)	3.42 (.07)	3.49 (.65)	3.19 (.07)	3.47 (.74)	3.24 (.06)
BES-SA	5.90	.00**	48.54 (7.76)	47.79 (.66)	48.18 (8.44)	51.02 (.69)	47.12 (7.95)	51.02 (.69)
BES-WC	11.64	.00**	29.74 (9.19)	29.39 (.72)	28.89 (8.44)	33.96 (.74)	28.34 (8.70)	33.26 (.67)
BES-PC	4.78	.01**	31.14 (6.92)	29.89 (.58)	29.21 (6.81)	32.29 (.60)	29.04 (7.06)	31.91 (.54)
MBSRQ	5.44	.01**	23.25 (5.39)	24.24 (.42)	23.98 (6.16)	25.89 (.41)	23.47 (5.56)	25.92 (.40)
DRES	5.09	.01**	2.61 (.92)	2.42 (.07)	2.64 (1.07)	2.08 (.08)	2.50 (1.02)	2.20 (.07)
PANAS-X	3.20	.04*	1.91 (.78)	1.85 (.07)	1.93 (.75)	1.62 (.07)	1.88 (.74)	1.64 (.07)
EDDS	3.60	.03*	19.61 (11.89)	17.31 (.98)	20.88 (13.22)	13.84 (.96)	19.51 (11.58)	14.37 (.92)

\*  $p < .05$ \*\*  $p < .01$

### **Differences between Racial Groups**

Non-ITT analyses were also conducted to examine whether there were differences in intervention effects between Black/African-American ( $n = 57$ ) and White ( $n = 91$ ) participants. These analyses did not include other ethnic/racial groups because of insufficient sample sizes. Two-way ANCOVAs were conducted for all outcome variables with group membership and race as independent variables and pretest scores and BMI entered as covariates. Results of all analyses indicated that there were no significant differences between these racial groups on intervention outcomes. Further, there were no significant interactions between group and race. Results remained nonsignificant when MITT analyses were conducted. See Table 4 for baseline and post-intervention non-ITT mean values broken down by racial/ethnicity.

Table 4.

*Baseline and post-intervention non-ITT means (SD) by race/ethnicity*

	Caucasian	African-American	Hispanic/ Latino	Asian/ Asian-American	Other	Multiracial
Pre-IBSS-R	3.62 (.65)	3.25 (.61)	3.32 (.66)	3.84 (.61)	3.58 (.73)	3.69 (.58)
Post-IBSS-R	3.33 (.67)	3.00 (.78)	3.12 (.55)	3.53 (.49)	3.63 (.66)	3.72 (.66)
Pre-BES-SA	46.06 (7.47)	51.50 (7.66)	47.00 (7.48)	44.59 (9.37)	45.40 (5.04)	49.32 (7.79)
Post-BES-SA	47.77 (7.29)	52.36 (8.41)	49.18 (7.15)	48.07 (8.86)	45.83 (5.15)	51.72 (8.27)
Pre-BES-WC	27.72 (8.68)	31.44 (8.48)	25.53 (8.68)	30.44 (8.87)	28.00 (6.90)	27.98 (9.27)
Post-BES-WC	31.39 (8.54)	33.95 (9.49)	30.82 (8.85)	34.27 (10.93)	29.33 (7.15)	30.94 (11.40)
Pre-BES-PC	29.38 (6.89)	30.99 (6.87)	28.25 (7.37)	29.22 (6.54)	28.50 (7.04)	29.83 (7.85)
Post-BES-PC	30.58 (6.73)	33.12 (7.27)	29.27 (6.54)	31.33 (9.57)	29.33 (2.25)	31.78 (7.13)
Pre-MBSRQ	22.88 (5.76)	25.27 (5.69)	23.11 (4.85)	22.82 (5.19)	22.70 (3.86)	22.32 (5.88)
Post-MBSRQ	24.92 (5.59)	27.09 (4.86)	24.00 (5.20)	24.40 (6.38)	25.83 (2.93)	23.67 (7.71)
Pre-DRES	2.73 (.95)	2.39 (1.08)	2.71 (.70)	2.31 (.94)	2.02 (.84)	2.89 (1.04)
Post-DRES	2.28 (.92)	2.13 (.94)	2.39 (.70)	2.21 (1.11)	1.98 (.85)	2.36 (.89)
Pre-PANAS-X	1.94 (.71)	1.77 (.73)	1.92 (.74)	2.05 (.82)	2.03 (.70)	2.05 (1.00)
Post-PANAS-X	1.74 (.80)	1.60 (.65)	1.55 (.69)	2.00 (1.00)	1.77 (.88)	1.67 (.71)
Pre-EDDS	20.58 (12.58)	19.51 (12.02)	21.72 (9.97)	18.74 (12.18)	15.45 (9.00)	20.27 (13.51)
Post-EDDS	15.27 (11.68)	14.56 (11.56)	17.55 (8.35)	15.47 (13.80)	14.00 (16.06)	15.25 (10.56)

## Intervention Dosage

**MITT analyses.** Exploratory MITT analyses were conducted to examine whether intervention dosage (i.e. total sessions attended, total number of homework assignments completed) was associated with outcomes among intervention group participants. A series of ANCOVAs were conducted examining how intervention dosage affected outcomes among all intervention participants combined. Intervention participants were combined because there were too few observations in some cells when data were broken down by group. Thus, all intervention participants were combined into one group to enhance the statistical power of the test. The first series of ANCOVA analyses used number of sessions attended as the grouping variable, with each of the outcomes serving as dependent variables. Baseline scores on outcomes and BMI were entered as covariates. Individuals who completed one and two sessions were collapsed together into one category because there were few individuals who completed only one session as well as the post-test. Thus, the resulting independent variable had two levels, one of which included participants who attended one or two sessions of the intervention and the second with included participants that attended all three sessions.

The assumption of homogeneity of variance was violated for the IBSS-R, BES-PC, and the DRES. Based on the recommendation of Tabachnick and Fidell (2007), a stricter  $\alpha$  of .01 was used for these analyses. An  $\alpha$  of .05 was retained for all other analyses. There was a significant association between sessions attended and thin ideal internalization (IBSS-R),  $F(1, 170) = 7.69, p = .00, \text{partial } \eta^2 = .04$ , such that individuals who attended three sessions had lower thin-ideal internalization scores ( $M = 3.19, SE = .06$ ) than intervention participants who attended one or two sessions ( $M = 3.41, SE = .06$ ). Significant differences were also observed for some of the body dissatisfaction variables. Specifically, intervention



participants who completed three sessions had higher scores ( $M = 33.69$ ,  $SE = .55$ ) on the BES-WC (indicating more positive feelings about features of their body related to weight) compared with participants who completed one or two sessions ( $M = 31.26$ ,  $SE = .61$ ),  $F(1, 170) = 8.65$ ,  $p = .00$ , partial  $\eta^2 = .05$ . Further, significant differences were observed for the MBSRQ,  $F(1, 170) = 5.11$ ,  $p = .03$ , partial  $\eta^2 = .03$ , such that individuals attending three sessions had higher scores (indicative of higher overall body satisfaction;  $M = 26.12$ ,  $SE = .33$ ) than individuals who attended one or two sessions ( $M = 25.03$ ,  $SE = .36$ ). Participants who attended three sessions also showed lower levels of restraint (DRES;  $M = 2.09$ ,  $SE = .06$ ) than those who attended one or two sessions ( $M = 2.38$ ,  $SE = .07$ ),  $F(1, 170) = 10.85$ ,  $p = .00$ , partial  $\eta^2 = .06$ . Additionally, differences were observed for the PANAS-X,  $F(1, 169) = 5.43$ ,  $p = .02$ , partial  $\eta^2 = .03$ , such that individuals who attended three sessions also reported lower scores ( $M = 1.74$ ,  $SE = .06$ ) compared with those who attended one or two sessions ( $M = 1.58$ ,  $SE = .05$ ). Finally, fewer eating disorder symptoms (EDDS) were reported among those who attended three sessions ( $M = 14.06$ ,  $SE = .73$ ) compared with individuals who attended one or two sessions ( $M = 17.00$ ,  $SE = .80$ ),  $F(1, 170) = 7.42$ ,  $p = .00$ , partial  $\eta^2 = .04$ . Table 5 provides baseline and post-intervention means by session completion.

Table 5.

*Baseline to post-intervention MITT means by session attendance*

			1-2 Sessions		3 Sessions	
	<i>F</i>	<i>p</i>	Baseline mean (SD)	Post mean (SE)	Baseline mean (SD)	Post mean (SE)
IBSS-R	7.69	.01**	3.52 (.75)	3.41 (.06)	3.43 (.63)	3.19 (.05)
BES-SA	1.25	.27	47.85 (8.54)	49.25 (.56)	47.36 (7.75)	50.10 (.51)
BES-WC	8.65	.00**	28.91 (8.96)	31.26 (.61)	28.22 (8.03)	33.69 (.55)
BES-PC	1.93	.17	29.67 (7.32)	30.60 (.46)	28.40 (6.33)	31.48 (.42)
MBSRQ	5.11	.03*	23.71 (6.04)	25.03 (.36)	23.74 (5.63)	26.12 (.33)
DRES	10.85	.00**	2.59 (1.09)	2.38 (.07)	2.54 (.99)	2.09 (.06)
PANAS-X	5.43	.02*	1.95 (.78)	1.76 (.06)	1.84 (.70)	1.58 (.05)
EDDS	7.42	.01**	21.12 (13.34)	17.00 (.80)	18.95 (11.00)	14.06 (.73)

\*  $p < .05$ \*\*  $p < .01$ 

ANCOVAs were also conducted with total number of homework assignments completed as the independent variable, and outcomes as the dependent variables. These ANCOVA analyses revealed that outcome scores on the PANAS-X and EDDS violated the assumption of homogeneity of variance. Thus a stricter  $\alpha$  of .01 was used for these analyses (Tabachnick & Fidell, 2001). Results did not reveal significant differences in outcomes based on number of homework assignments completed.

**Non-ITT analyses.** Dosage analyses were also conducted using a non-ITT approach. As with the MITT, ANCOVA analyses were conducted for each of the outcomes with session attendance as the independent variable. Baseline scores on outcomes and BMI were entered as covariates. Individuals who completed one and two sessions were collapsed into one category. A significant association was found between sessions attended and restraint,  $F$

(1, 130) = 9.17,  $p = .00$ , partial  $\eta^2 = .07$ , such that individuals who attended all three sessions showing lower levels of restraint ( $M = 2.03$ ,  $SE = .07$ ) than individuals that attended one or two sessions ( $M = 2.35$ ,  $SE = .08$ ). Further, individuals who attended three sessions also showed fewer eating disorder symptoms ( $M = 13.22$ ,  $SE = .82$ ) than participants that attended one or two sessions ( $M = 15.96$ ,  $SE = 1.06$ ). Results were non-significant for all other variables. Table 6 provides means between groups for session completion.

Table 6.

*Baseline to post-intervention non-ITT means by session attendance*

			1-2 Sessions		3 Sessions	
	<i>F</i>	<i>p</i>	Baseline mean (SD)	Post mean (SE)	Baseline mean (SD)	Post mean (SE)
IBSS-R	3.90	.05	3.52 (.75)	3.30 (.08)	3.43 (.63)	3.10 (.06)
BES-SA	.11	.75	47.85 (8.54)	49.96 (.77)	47.36 (7.75)	50.28 (.59)
BES-WC	3.35	.07	28.91 (8.96)	32.14 (.82)	28.22 (8.03)	34.03 (.63)
BES-PC	.47	.50	29.67 (7.32)	31.06 (.64)	28.40 (6.33)	31.62 (.49)
MBSRQ	1.01	.32	23.71 (6.04)	25.73 (.48)	23.74 (5.63)	26.34 (.37)
DRES	9.17	.00**	2.60 (1.09)	2.35 (.08)	2.54 (.99)	2.03 (.07)
PANAS-X	2.77	.10	1.95 (.78)	1.73 (.08)	1.84 (.70)	1.57 (.06)
EDDS	4.13	.04*	21.12 (13.34)	15.96 (1.06)	18.95 (11.00)	13.22 (.82)

\*  $p < .05$

\*\*  $p < .01$

ANCOVAs were also conducted with total number of homework assignments completed as the independent variable. Analyses revealed that the following outcome variables (PANAS-X, EDDS) violated the assumption of homogeneity of variance. As with previous analyses, a stricter  $\alpha$  of .01 was used for these variables. Results did not reveal significant differences in outcomes based on number of homework assignments completed.

## **Intervention Fidelity**

A random sample of sessions (25% of both face-to-face and online) was coded by two undergraduate research assistants to examine facilitator adherence to the manual. Group leaders covered 100% of main exercises and discussion points included in the manual. This approach to assessing intervention fidelity was deemed sufficient because the intervention used a highly scripted manual. Assistants also recorded the number of role-plays conducted for sessions two and three for both intervention groups (no role plays are conducted in session one). Differences were observed between intervention groups for number of role-plays conducted. Specifically, for session two, facilitators of the face-to-face intervention facilitated more role-plays (four to seven) than facilitators of the online intervention (who conducted between two and four). Similar results were found for session three (face-to-face facilitators conducted between three and seven role plays whereas online facilitators conducted two role plays across ratings). The difference in the number of role-plays conducted for the face-to-face and online groups was discussed in supervision. Group leaders relayed that despite pilot testing the online intervention, communication among participants in the actual online groups took much longer than face-to-face communication due to technical limitations. Thus, the difference in the number of role-plays conducted is not surprising given the fact that the online intervention took longer to deliver overall. During supervision of the interventions, group leaders also noted that in addition to discussing the origin and the perpetuation of the thin-ideal as originally outlined in the manual, it was also necessary to discuss differences between racial/ethnic groups in ideal body size and shape (not originally discussed in the manual), as many group members were African American and alluded to these differences during the intervention sessions.

## Discussion

Eating disorder symptoms are a significant concern, especially among college women (Kirk et al., 2001; Malinauskas et al., 2006; Mintz & Betz., 1988; Saules et al., 2009).

Because the transition to college has been shown to be a time when women are more likely to manifest various forms of eating pathology (Kirk et al., 2001; Mintz & Betz., 1988), there is a critical need for effective prevention programs appropriate for individuals of this age group.

Although some prevention efforts have yielded positive outcomes (e.g. dissonance-based programs; Stice & Shaw, 2004; Stice, Shaw, et al., 2008), their implementation may not always be practical given the range of resources required. The internet is becoming a highly utilized mode of intervention within the medical and mental health fields (Kenardy et al., 2006; Sampson et al., 1997; Warmerdam et al., 2007; Zetterqvist et al., 2003). One possible way to make dissonance programs more accessible to participants is to deliver such programs online. Web-based delivery is convenient and programs can be widely disseminated to a large number of individuals (Zabinski et al., 2003). However, no research to date has examined whether DB programs, an eating disorder prevention approach with significant empirical support (Becker et al., 2008; Becker et al., 2005; Becker et al., 2006; Mitchell et al., 2007; Stice et al., 2001; Stice, Marti, et al., 2008; Stice et al., 2011; Stice et al., 2006; Stice et al., 2007) can be effectively adapted for use online.

Thus, the aim of the current study was to examine whether an online DB prevention program could produce effects comparable to those of face-to-face DB interventions. It was hypothesized that both the face-to-face and online DB interventions would produce superior effects to those of an assessment-only control group. There were no a priori hypotheses about

potential differences between the face-to-face and online DB interventions because of the lack of empirical research on online delivery of dissonance programs.

Results of this study partially supported the original hypotheses. Using a MITT approach, analyses showed some intervention effects. Specifically, group differences were observed for many of the scales assessing body dissatisfaction (BES-WC, BES-PC, MBSRQ), such that individuals in both intervention groups reported less body dissatisfaction at post-intervention compared with assessment only participants. Intervention groups did not significantly differ from each other on these scales, indicating comparable intervention effects between groups for these variables. Additionally, there were group differences observed for the SA scale of the BES (also assessing body dissatisfaction), such that individuals in the face-to-face group showed higher scores (indicative of higher satisfaction with aspects of physical appearance related to sexual attractiveness) compared with the assessment only group. This difference was not observed between the online and assessment only groups, indicating that the face-to-face intervention produced superior effects compared to the online group. No differences were observed between face-to-face and online conditions. The same finding was observed for the DRES, with the face-to-face group showing significantly lower restraint scores compared with the assessment only group. Such differences were not observed between the online and assessment only group. No a priori hypotheses were made about how intervention groups would compare to each other, but the current findings indicate that the face-to-face intervention may produce superior effects across outcomes compared with the online intervention group. Original hypotheses were not supported for thin-ideal internalization, negative affect, or eating disorder symptoms, as significant differences were not observed for these variables.

Results were more promising when examined from a less conservative non-ITT approach. These results provide information about the effect of the intervention taking into account only those who completed post-test assessment. Non-ITT analyses showed that both the face-to-face and online groups had significant improvements compared with the assessment only group for all outcomes examined (i.e. lower thin-ideal internalization, less body dissatisfaction, lower restraint, lower negative affect, and fewer eating disorder symptoms). Intervention groups did not significantly differ from each other for any of these variables. Although only the face-to-face group produced effects for some variables (SA subscale of BES, DRES) when examined using MITT, when a non-ITT approach was implemented, the online group showed significant differences from the assessment only group for these outcomes as well. These findings suggest that the interventions perform comparably when examined from a non-ITT approach; however the MITT approach suggests that the face-to-face intervention may be superior to the online version.

MITT results from the current study partially support those of previous investigations of the utility of face-to-face DB interventions (e.g. Becker et al., 2005; Mitchell et al., 2007; Stice et al., 2001; Stice, Marti, et al., 2008; Stice, Mazotti, et al., 2000; Stice et al., 2006). Specifically, these prior studies have indicated that completion of face-to-face DB interventions is associated with reductions in body dissatisfaction and restraint. However, these previous studies have also observed post-intervention differences for other ED risk factors (thin-ideal internalization, negative affect) as well as reductions in overall eating disorder symptoms that were not seen in this study. Other studies have shown lower attrition rates (approximately 9-10% across studies) than that observed in the current study (39.1%). Further, previous studies have also reported higher rates of session attendance. For instance,

Stice et al. (2008) reported that 91% of participants completed all three dissonance sessions, compared to 41.5% in the current study. Part of these differences in retention may be reflective of differences in the recruitment strategies used for these studies. Specifically, Stice and colleagues (Stice et al., 2001; Stice, Marti, et al., 2008; Stice, Mazotti, et al., 2000; Stice et al., 2006; Stice et al., 2002) used samples in which participants were actively recruited to participate in the study via flyers, advertisements, etc. Participants were also offered more extensive financial incentives for completion of the study. Similarly, Becker and colleagues (Becker et al., 2008; Becker et al., 2005; Becker et al., 2006; Becker et al., 2010) have implemented sorority-based programs that are semi-mandatory for sorority members. The current study utilized a sample of undergraduate students from the Psychology 101 subject pool. Although students in this subject pool are offered some incentives (course credit) for completion of the study, there are many alternatives from which students can choose to meet their course research participation requirements. Thus, students may not have been as highly motivated to complete the study or may have completed all their course credits (by completing other studies in addition to the current one) before completing post-intervention assessments. Individuals who dropped out of the study after randomization were found to have higher baseline thin-ideal internalization scores than those who completed post-testing. This difference might be the reason post-intervention differences for thin-ideal internalization were not observed using MITT.

Non-ITT analyses (including only those who completed post-testing) provide more promising results than MITT, with group differences observed for all outcome variables. Non-ITT results for the present study are more similar to those seen in previous studies (Becker et al., 2005; Mitchell et al., 2007; Stice et al., 2001; Stice, Marti, et al., 2008; Stice,



Mazotti, et al., 2000; Stice et al., 2006) of DB interventions that have observed intervention effects for most outcome variables (e.g. thin-ideal internalization, body dissatisfaction, restraint, negative affect, and eating disorder symptoms). It is not surprising that results observed in non-ITT analyses are more comparable to findings from previous studies. One likely reason that non-ITT analyses are more comparable to findings from previous studies is that intervention completers are probably more comparable to samples from earlier investigations (Becker et al., 2005; Mitchell et al., 2007; Stice et al., 2001; Stice, Marti, et al., 2008; Stice, Mazotti, et al., 2000; Stice et al., 2006).

A secondary aim of the study was to examine whether intervention dosage (number of sessions attended, number of homework assignments completed) was associated with study outcomes among intervention participants. Sessions attended appeared to have the biggest impact on outcomes among all intervention participants. MITT analyses indicated that individuals who attended three sessions of either intervention showed decreased thin-ideal internalization, higher satisfaction with parts of body associated with weight (BES-WC), less body dissatisfaction (MBSRQ), lower restraint, lower negative affect, and fewer eating disorder symptoms compared with individuals who attended one or two sessions. Using a non-ITT approach, individuals who attended three sessions showing lower restraint and fewer eating disorder symptoms than participants who attended one or two sessions. Discrepancies between MITT and non-ITT results may have resulted from reduced statistical power to detect effects for non-ITT results (many individuals who only completed one or two sessions did not complete post-testing and thus were excluded from non-ITT analyses). These findings indicate the importance of complete session attendance in reducing eating disorder risk factors.

Unlike session attendance, significant differences were not observed with either MITT or non-ITT analyses for homework completion, thus indicating that number of homework assignments completed did not have a significant effect on study outcomes. Overall homework completion was relatively low for this study (28% for all three homework assignments), which may account for the lack of effects observed. No previous studies have reported findings from analyses examining how level of homework completion affected study results, although prior investigations (Stice, Marti, et al., 2008) have reported higher overall rates of homework completion (80%) than was observed in the present study. The low rate of overall homework completion may be related to the fact that participants had to send in homework for week three via email after completing the intervention sessions. Homework completion for week three was substantially lower for both intervention groups than for weeks one or two (see Table 1 for percentage homework completion by session and group), so it possible that not having future intervention sessions (during which they had to discuss their experience with homework assignments) had some effect on participants' rate of completion for the last homework assignment.

There are a number of implications of the current study. First, it appears that a web-based adaptation of this DB program shows some promise. For most variables, no differences were observed between the face-to-face and online groups, thus indicating comparable efficacy. In examining MITT analyses, there were two outcomes where the face-to-face intervention showed an effect not observed in the online group (BES-SA and the DRES). Thus, it is possible that the face-to-face modality has a greater impact than online delivery for some variables. Given that role-plays are a major part of DB programs, this difference in intervention implementation (e.g. fewer role plays being conducted in the online versus the

face-to-face groups) may account for the discrepancies in intervention effects between groups. It is possible that, with refinements, the online program the intervention may show more potent effects.

It is encouraging that analyses indicated that there were no differences by intervention group on rates of sessions attended or levels of homework completion, as it indicates that individuals are likely to attend the intervention regardless of mode of delivery. Further, levels of dropout were not significantly different between online and face-to-face groups, which also indicates that individuals did not appear to prefer one mode of delivery over another. The fact that online participants did not drop out of the intervention is promising given that there were some technological limitations of the online program that might have affected desirability of the online program compared to a face-to-face program. It appears that despite the fact that the online program was not as technologically sophisticated as may be desirable (e.g. program was somewhat slow to update chat messages, a limited number of previous chat messages could be viewed in the chat window, etc.), intervention participants were still willing to attend the group and did not appear to drop out of this arm of the study in greater proportions than was observed in the face-to-face groups. However, it is also interesting to note that despite the potential advantages of convenience and accessibility that may have promoted increased attendance in the online program, no differences in attendance were observed between intervention groups. It is possible that both interventions showed similar levels of attendance due to the nature of the intervention versus mode of delivery. It is also possible that with technological improvements made to the online program, greater adherence to the program might be observed.

There are many practical implications from the present study for researchers looking to develop an online DB program. One consideration regarding the online program was that the amount of time required for synchronous online communication. Despite pilot testing the intervention, group participants consistently responded more slowly than was anticipated by group facilitators (due to technological issues). The online intervention took longer to deliver overall, so many of the critical components of the intervention (e.g., role plays) had to be either condensed or combined (e.g. group as a whole conducted role plays together on several instances as opposed to role plays being conducted individually with each member). Communication in the chatroom was also somewhat disorganized at times because the online program was somewhat slow to update chat messages and only a small number of chat messages were visible in the chat window at one time (making it difficult to track the history of what group members had said). Frequently group members' responses to leaders' questions would post to the chat room after the discussion had shifted, which made the flow of conversation difficult to follow at times.

Researchers looking to refine an online DB program should consider either condensing the content of the intervention or conducting more sessions to cover the content within the online format. An alternative option would be to use another mode of online communication. For example, researchers may be able to adapt this type of intervention to be more similar to face-to-face interventions by using technology such as Skype or similar programs that would allow people to actually speak as opposed to typing their responses. The use of such technology would likely reduce the amount of time required to communicate, while also allowing the intervention to more closely resemble face-to-face interventions. A downside of this approach is that it would reduce the level of anonymity of the program.

Another potential option would be to perform the online chat intervention with participants individually as opposed to as a group. This approach would likely reduce the confusion inherent in a group chatroom (different group members responding to different questions at different times), but would also require much more time on the part of group leaders. Participants also would not have the opportunity to benefit from other group members' insights. It might also be beneficial for researchers to consider if this intervention could be effective if it was performed using asynchronous online communication (e.g. an online discussion board versus a chatroom). Adapting this type of intervention to an online discussion board would require a significant departure from the way the intervention is traditionally delivered (active participation and interaction between group members). However, it would be convenient if it could be delivered this way as group members would not need to be available at specific times of the day and could respond to discussions and activities on the discussion board at their own convenience.

There are important strengths of the current study. The main strength of this investigation is that it provided valuable information to guide prevention efforts for eating pathology among college women. Overall, the research for online prevention of eating disorders is promising (Celio et al., 2000; Low et al., 2006; Winzelberg et al., 1998; Winzelberg et al., 2000; Zabinski et al., 2001). However, programs that have shown positive outcomes are usually lengthy (requiring at least eight sessions). The current study provided valuable information about the feasibility of an online DB program, which involved fewer sessions (three total) than other online eating disorder prevention programs. This program showed some efficacy in reducing eating disorder risk factors and overall eating pathology, and with research replication and refinement it may serve as a shorter, more disseminable

online prevention program. Another strength of the study is that it compared results of the online DB program to a face-to-face DB group, which provided information about how these two delivery formats compare. Further, the current study replicates some of the findings of previous studies examining the efficacy of face-to-face DB programs, thus adding to the research base for this mode of eating disorder prevention.

Nonetheless, this study also has some limitations that should be taken into consideration. One limitation of the study is that it utilized a sample of undergraduates from the Psychology 101 subject pool who completed the study to fulfill course requirements rather than self-selecting to participate. Because individuals in the Psychology 101 subject pool are required to complete research projects for course credit, it can be reasonably assumed that such participants may not show the same level of motivation and interest to complete the intervention as participants who select themselves into a study that is advertised (the recruitment method for most previous DB studies). The nature of the sample used may have affected the rate of attrition observed in the study, which was higher than that of other studies examining DB programs. Study participants had multiple alternatives to completing the study, which probably affected their motivation to complete of posttest questionnaires. Many individuals also participated in other studies to quickly obtain the required number of research credits. During data collection, the research coordinator heard from many participants that Introduction to Psychology course instructors were encouraging them to complete their research credits relatively early in each semester (e.g. several course instructors offered extra credit for completion of research credits by mid-semester). It is also possible that students chose not to participate in the intervention because there was a delay (1-3 weeks) between completion of baseline questionnaires and randomization to conditions.

Because the study was conducted over the course of the semester, many participants probably chose to complete other studies to fulfill their requirements early in the semester. The difficulty in retaining participants may have decreased the likelihood of finding significant differences among groups on several outcomes. It is promising that non-ITT analyses showed more significant intervention effects (differences were observed for all outcomes examined) than those observed with MITT analyses (differences observed for body dissatisfaction variables and restraint only). Non-ITT findings provide information about group differences when individuals complete post-testing. Thus, it is possible that stronger effects may be observed in a future study that utilizes a different sample that may not show as high a rate of attrition as a sample from the Psychology 101 subject pool.

Another limitation of the study is that participants may not have been as “at risk” for eating pathology as participants in previous samples that utilized samples of participants who self-identify as having body image concerns. Participants in the present study did not have to self-identify as having body image concerns, although the study was advertised as an intervention for those who wanted to improve their body image. It is likely that many participants in the sample were at risk for eating pathology, however it is also probable that some participants were just completing the study to fulfill the research credit requirement of the Psychology 101 pool. Previous research (Stice & Shaw, 2004) indicates that prevention programs that target individuals “at risk” for eating disorders have larger effect sizes than those that do not. It is possible that there would have been more significant findings with sample that was more clearly “at risk.” However, some research (Becker et al., 2005) indicates that DB programs benefit individuals with varying levels of dissatisfaction (ranging from low to high). The current study did not replicate all of the findings of previous studies

that were more carefully targeted at individuals “at risk” for eating pathology; however, the fact that some group differences in eating disorder risk factors were observed indicates the intervention may still have had some impact despite varying levels of risk present within the sample. Thus, although it is a limitation that the current study was not as targeted as previous DB programs, it appears that the interventions examined still had some benefit for individuals at lower risk for eating pathology.

Another limitation relates to external validity of the findings of the present study. The study sample was composed entirely of college women, so results might not generalize to other samples of women or men. Further research is needed exploring prevention of eating disorders among men. Additionally, there were not sufficient sample sizes in the current study to examine racial/ethnic differences in intervention effects (aside from examining differences between Caucasian/White and Black/African-American participants for which no significant results were found). Thus, further research is needed examining how DB programs compare across racial/ethnic groups. Finally, the present study did not conduct follow-up assessments. This is a limitation, as the study does not provide information about long-term effects of both interventions. Future research should attempt to include follow-up assessments to examine long-term effects of both programs.

Given the pilot nature of the current study, future research should focus on replication and refinement of an online DB program, and compare such refined programs to traditional face-to-face delivery. Special attention should be focused on refining the content and timing of the intervention, as well as finding the most seamless mode of online delivery. Further, efforts should be made to encourage homework completion, as this was an area of weakness for the present study. It may be beneficial to use a different sample (not recruited from the



Psychology 101 subject pool) than that used in the present study, as it is possible that the sample characteristics may have affected overall compliance and motivation to complete the intervention. Furthermore, studies should examine how dosage variables (sessions attended, homework completed) affect study outcomes, as these analyses may provide information about what components of the intervention are most crucial to intervention effects.

Examining how dosage affects study outcomes by intervention groups may provide additional information regarding mode of implementation.

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## Appendix A

### Demographic Questionnaire

(Reminder, your scores will be aggregated with all other scores and this information cannot be used to identify you in any way).

1. Age: \_\_\_\_\_
2. Year in school (please check):  
☐ Freshman (first-year)  
☐ Sophomore  
☐ Junior  
☐ Senior  
☐ Graduated
3. Race/ethnicity (Check all that apply)  
☐ White/Caucasian  
☐ Black/African-American/African origin  
☐ Hispanic/Latino  
☐ Asian/Asian-American  
☐ Other
4. Sex (please check)  
☐ Male  
☐ Female
5. Height: \_\_\_\_\_
6. Weight: \_\_\_\_\_
7. What was your highest weight at your current height? \_\_\_\_\_
8. What was your lowest weight at your current height? \_\_\_\_\_
9. Are you a member of a sorority/fraternity? (please check)  
☐ Yes  
☐ No
10. Do you feel dissatisfied with your body?  
☐ Yes  
☐ No
11. Do you wish you were thinner?  
☐ Yes  
☐ No

## Appendix B

### Eating Disorder Diagnostic Scale (EDDS)

Please carefully complete all questions.

**Over the past 3 months...**

Not at all   Slightly   Moderately   Extremely

- |  |   |   |   |   |   |   |   |
|--|---|---|---|---|---|---|---|
| 1. Have you felt fat?  | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| 2. Have you had a definite fear that you<br>might gain weight or become fat?       | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| 3. Has your weight influenced how you think<br>about (judge) yourself as a person? | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| 4. Has your shape influenced how you think<br>about (judge) yourself as a person?  | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
- 

5. During the past **6 months** have there been times when you felt you have eaten what other people would regard as an unusually large amount of food (e.g., a quart of ice cream) given the circumstances?

YES   NO

6. During the times when you ate an unusually large amount of food, did you experience a loss of control (feel you couldn't stop eating or control what or how much you were eating)?

YES   NO

7. How many **DAYS per week** on average over the **past 6 MONTHS** have you eaten an unusually large amount of food and experienced a loss of control?

0   1   2   3   4   5   6   7

8. How many **TIMES per week** on average over the **past 3 MONTHS** have you eaten an unusually large amount of food and experienced a loss of control?

0   1   2   3   4   5   6   7   8   9   10   11   12   13   14

**During these episodes of overeating and loss of control did you...**

9. Eat much more rapidly than normal?   YES   NO

10. Eat until you felt uncomfortably full?      YES    NO
11. Eat large amounts of food when you didn't feel physically hungry?    YES    NO
12. Eat alone because you were embarrassed by how much you were eating?    YES      NO
13. Feel disgusted with yourself, depressed, or very guilty after overeating?      YES      NO
14. Feel very upset about your uncontrollable overeating or resulting weight gain? YES    NO
- 

15. How many **times per week** on average over the past **3 months** have you made yourself vomit to prevent weight gain or counteract the effects of eating?

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

16. How many **times per week** on average over the past **3 months** have you used laxatives or diuretics to prevent weight gain or counteract the effects of eating?

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

17. How many **times per week** on average over the past **3 months** have you fasted (skipped at least 2 meals in a row) to prevent weight gain or counteract the effects of eating?

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

18. How many **times per week** on average over the past **3 months** have you engaged in excessive exercise specifically to counteract the effects of overeating episodes?

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

---

19. How much do you weigh? If uncertain, please give your best estimate. \_\_\_\_\_ lbs.

20. How tall are you? \_Please specify in inches (5 ft.= 60 in.)\_\_\_\_\_ in.

21. Over the past **3 months**, how many menstrual periods have you missed?

0    1    2    3    n/a

22. Have you been taking birth control pills during the past **3 months**?                      YES      NO

## Appendix C

### Ideal Body Stereotype Scale-Revised (IBSS-R)

**Directions:** We want to know what you think attractive women look like. How much do you agree with these statements:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Disagree
1. Slender women are more attractive.....	1	2	3	4	5
2. Women who are in shape are more attractive.....	1	2	3	4	5
3. Tall women are more attractive.....	1	2	3	4	5
4. Women with toned (lean) bodies are more attractive.....	1	2	3	4	5
5. Shapely women are more attractive.....	1	2	3	4	5
6. Women with long legs are more attractive.....	1	2	3	4	5

## Appendix D

### Multidimensional Body Self-Relations Questionnaire- Appearance Evaluation Subscale (MBSRQ-AE)

Below are a series of statements about how people may think, feel, or behave. You are asked to indicate the extent to which each statement pertains to your personality. Your answers to the items are anonymous, so please do not write your name on any of the materials. Using the scale below, indicate your answer by entering it to the left of the number of the statement.

1	2	3	4	5
Definitely Disagree	Mostly Disagree	Neither Agree or Disagree	Mostly Agree	Definitely Agree

- \_\_\_\_\_ 1. My body is sexually appealing.
- \_\_\_\_\_ 2. I like my looks just the way they are.
- \_\_\_\_\_ 3. Most people would consider me good looking.
- \_\_\_\_\_ 4. I like the way I look without my clothes on.
- \_\_\_\_\_ 5. I like the way clothes fit me.
- \_\_\_\_\_ 6. I dislike my physique.
- \_\_\_\_\_ 7. I am physically unattractive.

## Appendix E

### Body Esteem Scale (BES)

**Directions:** On this page are listed a number of body parts and functions. Please read each item and indicate how you feel about this part or function of your own body using the following scale:

- 1 = Have strong negative feelings
- 2 = Have moderate negative feelings
- 3 = Have no feeling one way or the other
- 4 = Have moderate positive feelings
- 5 = Have strong positive feelings

- 
- |                               |       |
|-------------------------------|-------|
| 1. body scent                 | _____ |
| 2. appetite                   | _____ |
| 3. nose                       | _____ |
| 4. physical stamina           | _____ |
| 5. reflexes                   | _____ |
| 6. lips                       | _____ |
| 7. muscular strength          | _____ |
| 8. waist                      | _____ |
| 9. energy level               | _____ |
| 10. thighs                    | _____ |
| 11. ears                      | _____ |
| 12. biceps                    | _____ |
| 13. chin                      | _____ |
| 14. body build                | _____ |
| 15. physical coordination     | _____ |
| 16. buttocks                  | _____ |
| 17. agility                   | _____ |
| 18. width of shoulders        | _____ |
| 19. arms                      | _____ |
| 20. chest or breasts          | _____ |
| 21. appearance of eyes        | _____ |
| 22. cheeks/cheekbones         | _____ |
| 23. hips                      | _____ |
| 24. legs                      | _____ |
| 25. figure or physique        | _____ |
| 26. sex drive                 | _____ |
| 27. feet                      | _____ |
| 28. sex organs                | _____ |
| 29. appearance of the stomach | _____ |



- 30. health \_\_\_\_\_
- 31. sex activities \_\_\_\_\_
- 32. body hair \_\_\_\_\_
- 33. physical condition \_\_\_\_\_
- 34. face \_\_\_\_\_
- 35. weight \_\_\_\_\_

## Appendix F

### Dutch Restrained Eating Scale (DRES)

**Directions:** Circle the best answer to describe your behavior over the last month:

	Never	Seldom	Sometimes	Often	Always
1. If you put on weight, did you eat less than you normally would?	1	2	3	4	5
2. Did you try to eat less at mealtimes than you would like to eat?	1	2	3	4	5
3. How often did you refuse food or drink because you were concerned about your weight?	1	2	3	4	5
4. Did you watch exactly what you ate?	1	2	3	4	5
5. Did you deliberately eat foods that were slimming?	1	2	3	4	5
6. When you ate too much, did you eat less than usual the next day?	1	2	3	4	5
7. Did you deliberately eat less in order not to become heavier?	1	2	3	4	5
8. How often did you try not to eat between meals because you were watching your weight?	1	2	3	4	5
9. How often in the evenings did you try not to eat because you were watching your weight?	1	2	3	4	5
10. Did you take into account your weight in deciding what to eat?	1	2	3	4	5

## Appendix G

### Positive and Negative Affect Scale-Revised (PANAS-X)

**Directions:** Please circle the response that indicates how you have felt during the past week.

	not at all	a little	moderately	a lot	extremely
1. Disgusted with self . . . .	1	2	3	4	5
2. Sad. . . . .	1	2	3	4	5
3. Afraid . . . . .	1	2	3	4	5
4. Shaky. . . . .	1	2	3	4	5
5. Alone. . . . .	1	2	3	4	5
6. Blue. . . . .	1	2	3	4	5
7. Guilty . . . . .	1	2	3	4	5
8. Nervous. . . . .	1	2	3	4	5
9. Lonely. . . . .	1	2	3	4	5
10. Jittery. . . . .	1	2	3	4	5
11. Ashamed . . . . .	1	2	3	4	5
12. Scared . . . . .	1	2	3	4	5
13. Angry at self . . . . .	1	2	3	4	5
14. Downhearted. . . . .	1	2	3	4	5
15. Blameworthy. . . . .	1	2	3	4	5
16. Frightened . . . . .	1	2	3	4	5
17. Dissatisfied with self. .	1	2	3	4	5
18. Anxious. . . . .	1	2	3	4	5
19. Depressed . . . . .	1	2	3	4	5
20. Worried . . . . .	1	2	3	4	5

## **Vita**

Kasey Lyn Serdar was born July 23, 1984 in Sandy, Utah, and is an American Citizen. She graduated from Riverton High School in Riverton, Utah in June of 2002. She completed her undergraduate studies in June of 2006 at Westminster College in Salt Lake City, Utah, with a Bachelor of Science in Psychology with a minor in Sociology. During her time at Westminster she completed the McNair Scholars Program and worked on research examining students perceptions of professors based on their racial/ethnic background. She and also worked as research assistant to Dr. Janine Wanlass, Dr. Colleen Sandor, and Dr. Lesa Ellis, and worked as a Supplemental Instructor for undergraduate courses in Abnormal Psychology and Personality Theory. After finishing her undergraduate studies, she came to Richmond, Virginia in August of 2006 to begin graduate work in the doctoral program in Counseling Psychology at Virginia Commonwealth University under the direction of Dr. Suzanne Mazzeo. She earned her Master of Science degree in psychology 2008 after completing her thesis project, which examined the correlates of weight instability in a population-based sample. During her tenure in the counseling psychology program, Kasey has worked on several research projects. Such projects include involvement in development and implementation of the NOURISH program, an intervention for parents of children who are overweight or obese. Kasey's research and clinical interests include eating disorder treatment and prevention, treatment of obesity and chronic illness, women's issues, trauma/PTSD, substance abuse, and group therapy. She is currently completing her clinical internship at the Greater Los Angeles Veterans Affairs Healthcare System, Los Angeles Ambulatory Care Center (LAACC), and expects to graduate in August 2012.